Climate Change: Myths & Realities

[Annexure-I: Weather Aberrations Perspective of Dry-land Agriculture in Andhra Pradesh]

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వాతావరణంలో భ్రమలు, వాస్తవాలు

డా॥ వళ్ల జీవానందరెడ్డి

వాతావరణంలో మార్పులనేవి ఎంతో విశాలమైన అంశం. దీనిలో రెండు ముఖ్య అంశాలు ఇమిడి ఉన్నవి. మొదటిది సహజ సిద్ధమైన మార్పులు. ఇవి మానవుని చేతిలో లేవి. అందువల్ల వీటికి అనుగుణంగా మన పద్ధతి విధానాలు మార్చుకోవాలి. వీటిని వలయాలు అంటారు. దీనిలో భాగమే వరదలు - కరువులు. ప్రపంచవ్యాప్తంగా మానిటర్ చేసే ఇలాంటి వాటి అవసరాలు చరిత్ర పుటల్లో మాదవచ్చు. దీనికి ఉదాహరణ, ఋతువు - నైరుతి పరిణామ. రెండవది మానవకృత మార్పులు. వీటిని పెరగడం - తరుగడం అంటారు.

సమాజిద్ధమైన మార్పుల విషయానికివస్తే, మన దేశ నైరుతి ఋతుపవన కాలం (జూన్ నుంచి సెప్టెంబర్) లోని వర్షపాతంలో '60' సంవత్సరాల వలయం కనిపిస్తుంది. ఇది మన సాంప్రదాయ జ్యోతిషశాస్త్రంలోని '60' సంవత్సరాలులాగే మారుతుంది. ఈ '60' సంవత్సరాలలో 30 సంవత్సరాలు మంచి వర్షాల వలయం. దీనిలో వరదలు ఎక్కువ. కరువులు తక్కువ. మిగతా 30సంవత్సరాలు తక్కువ వర్షాల వలయం. దీనిలో వరదలు తక్కువ, కరువులు ఎక్కువ. ఇలాంటి విధానం మన నదులలో మళ్ళీ వరదలలో కూడా చూడవచ్చు. ఉదాహరణకు టీవీ, రాని. టియ్, వగైరాలు. అంటే వీటికి అనుగుణంగా మన విధివిధానాలు మార్చు కోవాలి.

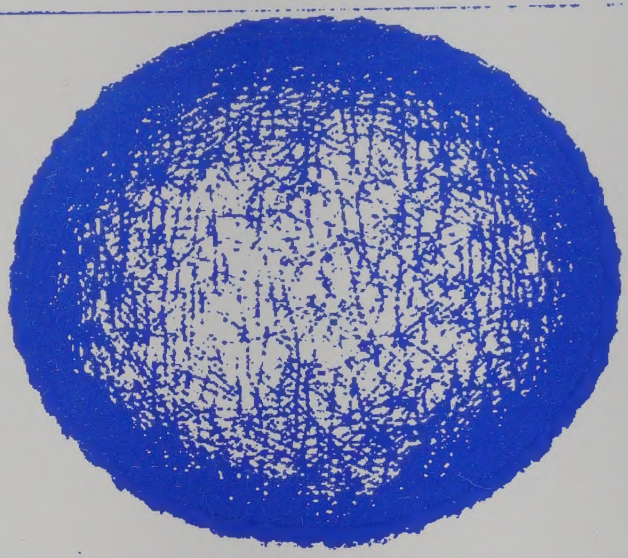
ప్రపంచ వ్యాప్తంగా వర్షపాతంలో ఇలాంటి వలయాలను మాదవచ్చు. సూర్యుడిపై మచ్చ మచ్చలు-మంటలలో కూడా ఈ వలయాలను మాదవచ్చు. అతి చిన్న 22 సంవత్సరాల వలయం ఎరిట్రియా దేశంలోని అస్మారా వర్షపాతంలో ఉంటే, అతి పెద్ద 66 సంవత్సరాల వలయం దక్షిణాఫ్రికాలోని డర్బన్ వర్షపాతంలో ఉంది. ఉష్ణోగ్రతలలో జరిగే ఇలాంటి మార్పుల వలయాల Ice ages అంటారు ఇవి వేల సంవత్సరాల వలయాలు.

ఇప్పుడు ఎక్కువగా ప్రపంచవ్యాప్తంగా ప్రచారంలో ఉన్నది మానవ తప్పిదాల వల్ల పెరుగుతున్న గ్రీన్‌హౌస్ గ్యాసెల వల్ల భూగోళం వేడెక్కుతున్నదనేది. దీనిలో ఐతొక్కటి ఓజోన్ పొర దెబ్బతింటున్నదనేది. వాతావరణంలో మార్పులంటే భూమి వేడెక్కడమేనని ప్రచారం జరుగుతున్నది. కానీ ఇది వాతావరణంలో జరిగే మార్పులలో ఒక భాగం మాత్రమే. మనలాంటి అభివృద్ధి చెందుతున్న దేశాలలో అతి ముఖ్యమైన మానవాళిత మార్పులను ఎకలాజికల్ మార్పులు. అంటే భూమి దానిపై జరిగే మార్పులకు సంబంధించినవేవన్నమాట. అంటే వ్యవసాయం పెరిగి ఉష్ణోగ్రతలో పెరుగుదల; అడవులను నాశనం చేయడం ద్వారా ఉష్ణోగ్రతలు, వర్షపాతం, గాలి. వీటి అవిరిలో మార్పులు; రోడ్ల నిర్మాణం, వ్యవసాయం [illegible] వగైరాలవల్ల వాతావరణంలో మార్పులు. వీటివల్ల వాతావరణంలో మార్పులే గాక గ్రీన్‌హౌస్ గ్యాసెల్లో కూడా తోటుదేసుకొంటాయి. ఇవన్నీ ఆయా ప్రాంతాలపై ప్రభావం ఉంటాయి. ఉదాహరణకు మన వ్యవసాయం రిజర్వాయర్ల వల్ల వర్షపాతం పెరుగుదల వ్యవసాయంలో ఉష్ణోగ్రత పెరుగుదల కనిపిస్తున్నది.

భయాందోళనలకు మూలాలు

ఈ మధ్య కాలంలో పామరుడు నుంచి పండితు ప్రతి విషయాన్ని 'గుడ్డివాడు దీపపు స్తంభాన్ని గింతకొన్నట్లు' భూగోళం వేడెక్కడం అనే అంశానికి ప్రజలలో భయోత్పాదనలు కల్పిస్తున్నారు. వీటిల ముఖ్య అంశాలు సముద్రాలు ఉప్పొంగడం, మంచు తరుగడం. వీటి ద్వారా మానవ మనుగడే ప్ర మారుతుందనేది.

కాలుష్యం వల్ల గ్రీన్‌హౌస్ గ్యాస్ పెరగడం, భూగోళం వేడెక్కుతుందనే వాదనపై ప్రపంచ దేశా గ్రీన్‌హౌస్ గ్యాసును తగ్గించుకునే దిశలో జరుగుతున్నది. ఈ గణాంకాల సేకరణ చాలా వరకు తరువాతే జరిగింది. ఇది కూడా చాలా తక్కువ ప్ర అనుమానంగా సేకరించడం జరిగింది. అంతకు సమాచారం విషయంలో పరిశోధనల ద్వారా అ చేయడం జరిగింది. దీనికి ముఖ్య కారకాలు ఫాజి



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ప్రాంతాలలో ఎలాంటి మార్పులు లేవు. మొదటిలో 12 ప్రాంతాలలోని గాను 4 చదరపు సముద్ర మట్టం తగ్గితే, మిగతా 8 చదరపు ఎలాంటి మార్పు జరగలేదు. మోడల్స్ ద్వారా ఉష్ణోగ్రతలు 2-6 డిగ్రీల సెలిసియస్ పెరుగు తాయంటే, దాని ప్రకారం సముద్ర మట్టాలు పెరుగుతాయని మోడల్స్ చెప్తున్నాయి. కానీ ఈ మోడల్స్ చెప్పేది ఖచ్చితంగా కాదని తేలింది. ఈ పెరుగుదలపై ఎంతో వివాదాస్పదం ఎన్నో రెట్లు ఖండించడం జరిగినప్పటికీ. ఇది శాస్త్రీయంగా చూస్తే ఖచ్చితం లేదా ప్రమాదమని 10శాతం కంటే ఎక్కువ ఉండకూడదు. అంటే మోడల్స్ ద్వారా లెక్కిని చెప్పేవన్నీ వాస్తవానికి సగటు నాగలోకంటు ఉన్నత వ్యత్యాసం అంటే సత్యదూరం.

మంచుకొండలు కరగటం అనే వాదనపై హిమాలయ పర్వతాలలో మంచుకొండలు తరిగిపోతున్నాయనే అంశంపై ఈ మధ్యనే భారత పర్యావరణ అడవుల మంత్రిత్వశాఖ జియోలాజికల్ సర్వే ఆఫ్ ఇండియా అధ్యయన ఫలితాలను ప్రజలకు అందుబాటులోకి తెచ్చింది. దీని సారాంశం. భూమి వేడెక్కడం వల్ల హిమాలయాల్లో మంచు కొండలు కరగడం లేదు కానీ భూమిలో జరిగే మార్పుల వల్ల వచ్చే ప్రకంపనలవల్లనైతేనేమి కొన్ని ప్రాంతాలలో మార్పులు చేర్పులు జరగడం జరిగింది. ఇక్కడ మనం ముఖ్యంగా గ్రహించవలసిన ఇంకొక్క ముఖ్య విషయం హైడ్రలాజికల్ సైకిల్ ప్రభావం. ఇది వర్షపాత వలయాలకు అనుగుణంగా మార్పులు జరుగుతుంటవి. ఈ అంశం కూడా పరిగణలోకి తీసుకోవాల్సిన అవసరమెంతైనా ఉంది.

మార్పులను అరికట్టే దిశలో చేపట్టవలసిన విధి విధానాలు: కాలుష్యం పృథ్వాకారంలో పెరుగుదలకు ముఖ్యకారకాలు మూడు. జనాభా పెరుగుదల, కొత్త కొత్త భవన విధానాలు, కొత్త కొత్త సాంకేతిక విధానాలు/పరిజ్ఞానాలు.

వీటికితోడు పైన చర్చించుకున్న వివిధ వాతావరణ మార్పులకు సంబంధించిన అంశాలను, ముఖ్యంగా క్లైమేట్ చేంజెస్ పరిగణలోకి తీసుకొని భారత ప్రభుత్వం వాతావరణ మార్పులను ఎదుర్కొనే దిశలో '8' అంశాలను నేషనల్ యాక్షన్ ప్లాన్ ఆన్ క్లైమేట్ చేంజ్ కింద ఇవ్వడం జరిగింది. ఇవి పర్యావరణానికి హాని కలిగించని ప్రత్యామ్నాయాలను శోధించడం, జల-ఔర - పవన విద్యుత్ ఉత్పాదనలపై దృష్టి సారించడం, కాలుష్య రహిత సాంకేతిక పరిజ్ఞానాన్ని సాధించడం వగైరాలు. ఈ '8' దిండిని చూద్దాం.

1. నేషనల్ సోలార్ మిషన్, దీనికి గాను రూపాయలు 90కోట్ల ప్రాజెక్టును జీవలే కేంద్ర ప్రభుత్వం అనుమతించింది. 2. నేషనల్ మిషన్స్ ఫర్ ఎన్‌హాన్స్‌డ్ ఎనర్జీ.ఎఫిషియన్సీ. దీనికి కూడా రూపాయలు 75వేలకోట్ల ప్రాజెక్టును జీవలే [illegible] ప్రభుత్వం అనుమతించింది. 3. నేషనల్ [illegible] అన్ సస్టేయినబుల్‌హాబిటల్ 4. నేషనల్ నేషనల్ మిషన్ ఫర్ బయోయినింగ్ [illegible]ష్యం 6. నేషనల్ మిషన్ ఫర్ ఎ నేషనల్ మిషన్ ఫర్ సస్టేయినబుల్ [illegible]ల్ మిషన్ ఆన్ స్ట్రాటజిక్ నాలెడ్జ్‌ఫర్ [illegible]-8 విషయానికి వస్తే, ఇవి ఇప్పటికే [illegible]ప్రాజెక్టులు.

[illegible]1,2) ప్రత్యామ్నాయ ఇంధన [illegible]మరులు [illegible]చినవి కాగా, 3 నుంచి 7 [illegible]లాజికల్ [illegible]చిన విషయాలు. మూడవది [illegible]ష్యజీ [illegible]నది. 4,6 నీటివనరులు వనదురం/ [illegible]చినది. 7వది వ్యవసాయానికి సంబంధిం [illegible]ది. వాతావరణ మార్పులపై పరిశోధ [illegible]కు చేపట్టవలసిన ముఖ్య అంశాలు కొన్ని: [illegible] విద్యుత్ ఆదాచేయడం. గాలి వీరు [illegible] ఉత్పత్తి. విద్యుత్ ఆదా చేసే పరికరాల [illegible]రిత విద్యుత్ ఉత్పత్తి పరిజ్ఞానంలో [illegible]ర్యశక్తి ఆధారిత విద్యుత్ వినియోగం. [illegible]రమైన వ్యవసాయ ప్రాధాన్యం ఇవ్వడం. [illegible]చినవాన్ని/అడవులను పరిరక్షించు కోవడం [illegible] వ్యవసాయంలో రసాయనిక ఎరువుల [illegible] ఎరువులు వాడకం. వాతావరణ [illegible]టంగా వ్యవసాయం. నీటివనరుల [illegible]ంచిన సాంకేతిక పరిజ్ఞానాన్ని

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Climate Change: Myths & Realities

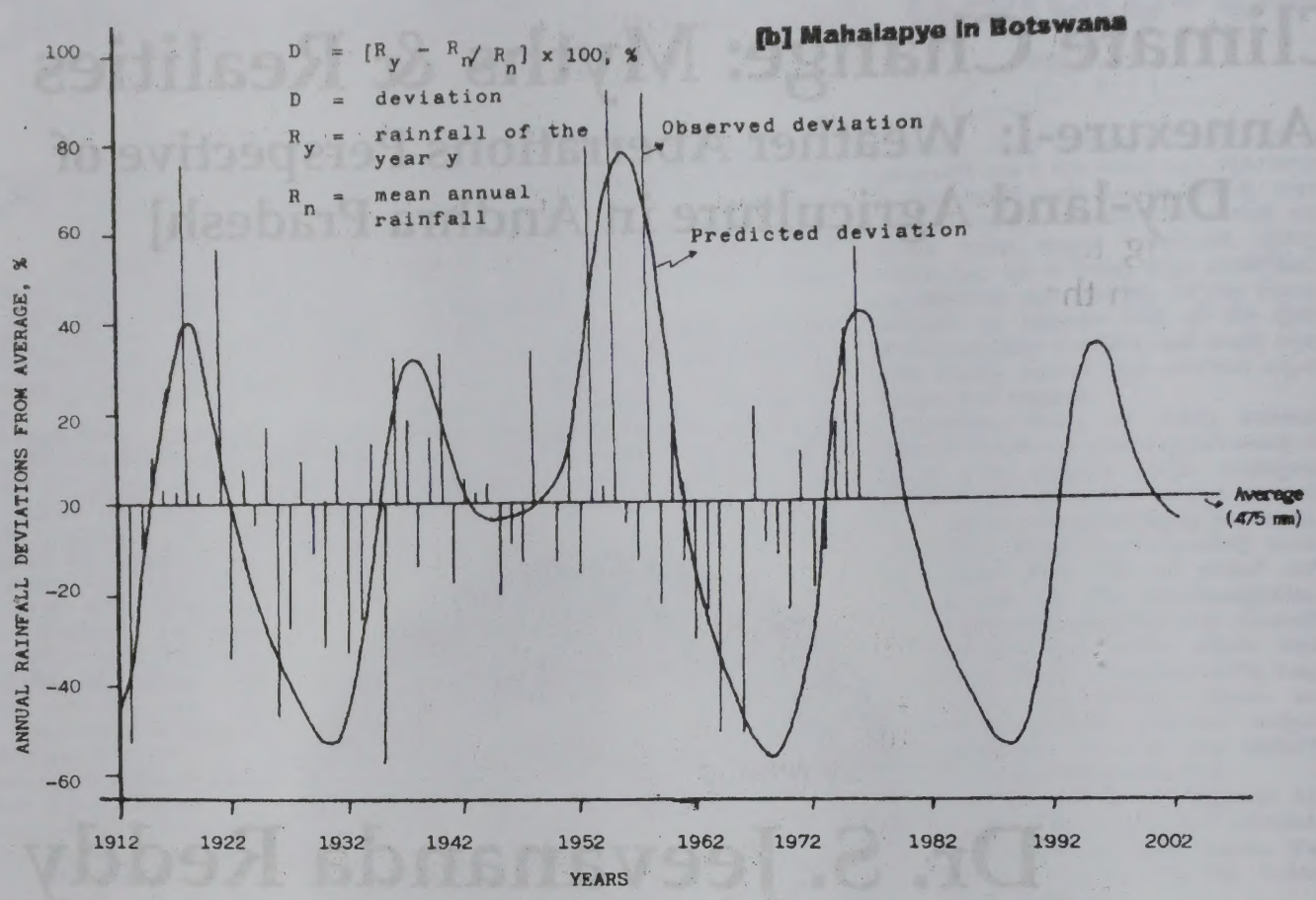
[Annexure-I: Weather Aberrations Perspective of Dry-land Agriculture in Andhra Pradesh]

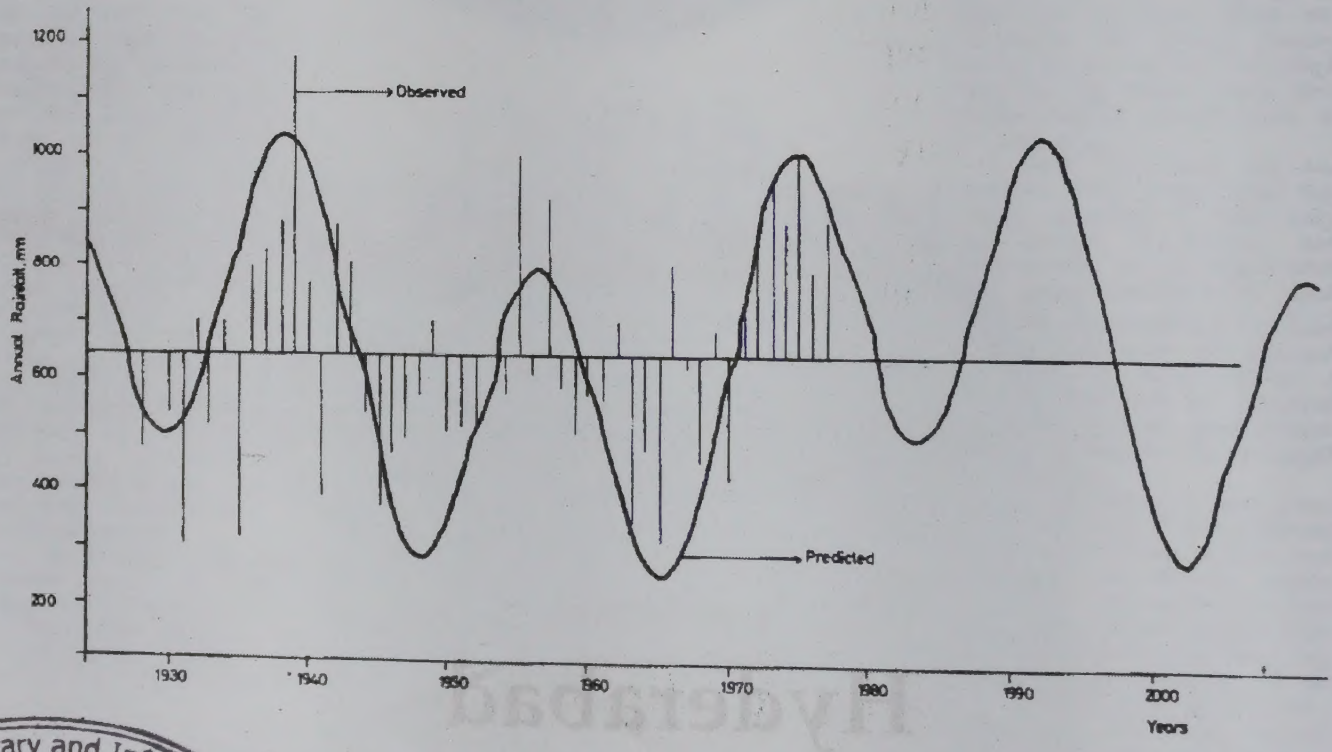
Dr. S. Jeevananda Reddy

Hyderabad

14th January - 2010

Centre for Study of Science, Technology and Development (CSTD)
Kotamangala
Bangalore - 34





Annual march of observed & predicted annual rainfall of Catuane in Mozambique, southern Africa

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Preface

In recent years man on the street to scientists in the lab are attributing every thing they observed on day to day basis or in their research, to a phenomenon that is not well understood even by scientific community, that is global warming, which is being used as de facto climate change. For such people, it has become a fashion to use the word "Climate Change" like an "adjective" in their talks, speeches and articles/reports. Without any base in a casual tone, Sharad Pawar, agriculture minister, Government of India at a press meet says global warming affected this year's production!!! On the contrary Andhra Pradesh achieved bumper crop production during 2008-09 crop-years.

Analysis of rainfall data during 1871 to 2002 suggests that rainfall deficit observed during 2002 in Andhra Pradesh is not unusual. In the past also experienced worse than 2002 situation. The table presented below suggests that production is not directly related to prevailing weather drought conditions per se. During 2008-09 Rabi crop-season though the water in River Godavari at Dawaleswaram dam was very low, government initiated a novel method to counter the deficit water by digging bore wells in the river Godavari bed; and as a result achieved bumper crop production. On the contrary, by mis-using of Nagarjunasagar reservoir water during 2008-09 crop-seasons, the Kharif in 2009-10 failed with the failure of early season rains.

Year	Production (Lakh tons)	Number of Mandals declared as drought affected
1995-96	116.64	-
1996-97	136.81	-
1997-98	108.22	920*
1998-99	149.10	-
1999-00	136.97	688
2000-01	160.27	142
2001-02	148.36	995*
2002-03	102.85	1041

All these give insight into unusual events with reference to droughts & floods we have been experiencing in our life-time. Some are associated with weather aberrations in built in nature and some are due to human errors due to improper planning. Therefore, to achieve sustainable production under variable weather aberrations and to better utilization of public funds on droughts &

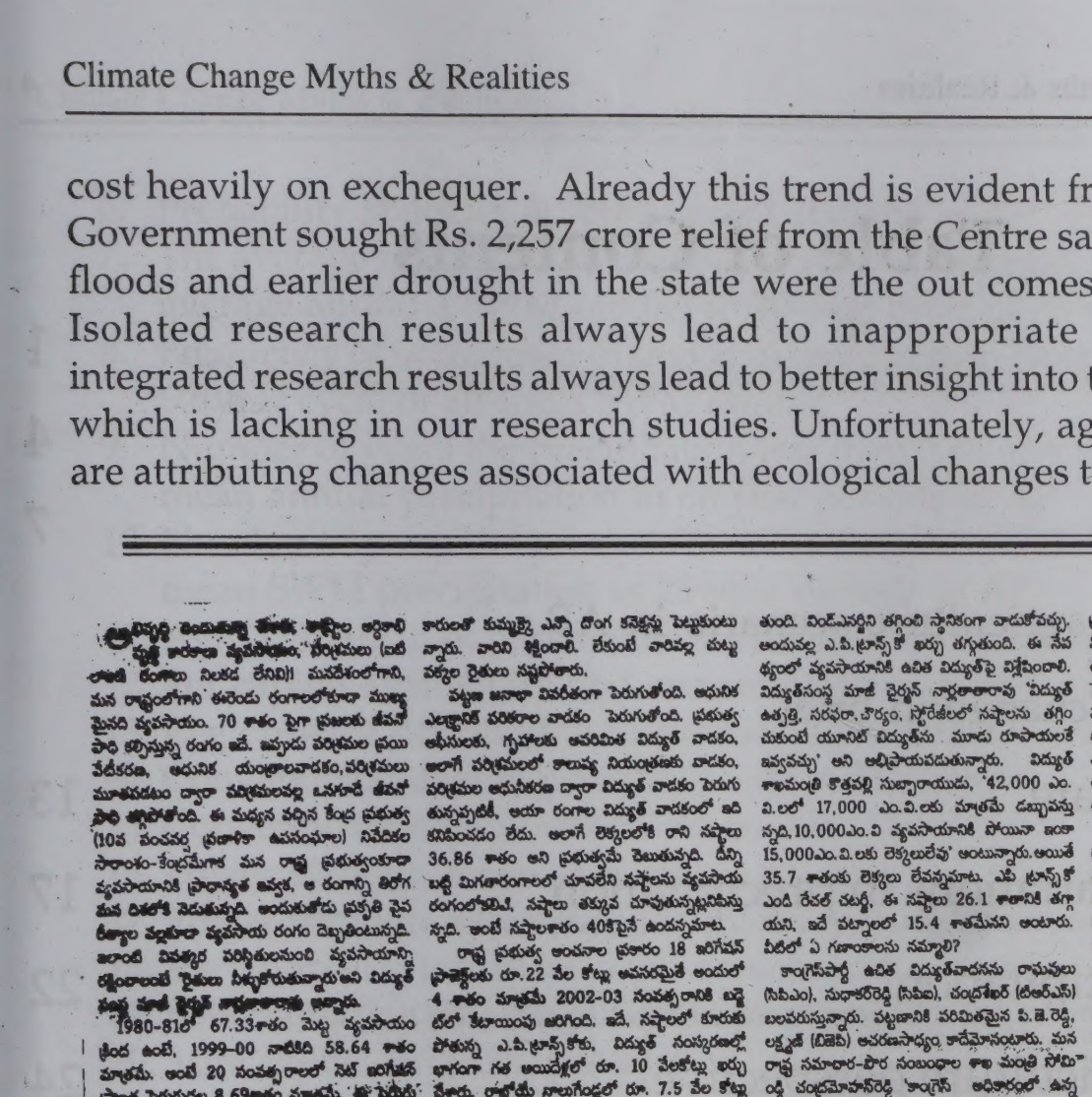
floods, it is necessary to study the weather aberrations at a given area and adopt agriculture to the observed system rather than making irrelevant postulations attributing to global warming. Governments must be careful in people with motivated interests like Western funded NGOs, farmers' leaders, scientists & bureaucrats with Western mind set. It is hazardous to follow such peoples' path.

Blindly attributing everything to "global warming" has disastrous consequences on ecology and crop production and as well economy of the nation. In fact the quantum of increase seen in surface temperature is not that much high that is going to influence the global or regional or local circulation patterns as well the observed increase in surface temperatures are quite different over different parts of the globe. In fact, the recent Copenhagen conference of world bodies exposed the hollowness of the global warming. The statement of mine that "the Science of Climate Change is being used as Global Warming & Carbon Credits" has entered on the streets of Copenhagen with the expose by a London media. It exposed IPCC's Chairman, Rajendra K. Pachauri's role in dealings of carbon credits, by accepting to be a member of boards and committees of several organizations, institutions, etc that have direct & indirect interests in this direction. This type of honour was given to him not because of his talent but because of his post in IPCC. In addition, TERI in New Delhi in which he is associated, was a preferred bidder for Kuwait contracts to clean up the mess left behind by Saddam Hussein in their oilfields in 1991 for which UN has provided $3 billion as cost of the contracts. A person holding such an important position should have not accepted to associate with agencies that are expecting favours from IPCC or UN. It is the basic ethic that should have been followed by Pachauri instead slamming "conflict of interest charges".

The other important expose at Copenhagen summit surprisingly is that of AlGore's claim "the latest research showed that the Arctic could be completely ice-free in five years", quoting as from Dr. Wieslav Maslowski. On the contrary Dr. Maslowski said "It's unclear to me how this figure was arrived at". The embarrassing error cast another shadow over the conference after the controversy over the hacked emails from the University of East Angilas Climate Research Unit, which appeared to suggest that scientists had manipulated data to strengthen their argument that human activities were causing global warming. We must remember here one thing that IPCC and AlGore jointly received Noble Prize based on such spurious results & manipulations.

There is a need to have independent research by analyzing the meteorological data in all angles rather than depending on spurious or manipulated results to get international funds for their research and good posts in international organizations such as IPCC. Other-wise negative repercussions

cost heavily on exchequer. Already this trend is evident from the way Orissa Government sought Rs. 2,257 crore relief from the Centre saying that the recent floods and earlier drought in the state were the out comes of climate change. Isolated research results always lead to inappropriate conclusions while integrated research results always lead to better insight into the state of weather, which is lacking in our research studies. Unfortunately, agricultural scientists are attributing changes associated with ecological changes to global warming!!!



రైతులకు ఉచిత విద్యుత్ అంశంపై ఒక నిపుణుని వ్యాఖ్య

ప్రాంతీయ అసమానతల దృష్ట్యా అవసరమే!

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Copenhagen Effect

UN Climate Panel (IPCC) admits glacier goof-up — now says the Himalayan Glaciers won't melt by 2035. Last week, the UN panel - a panel of 2,500 climate scientists (?) of the world — had expressed regret for erring on the Himalayan glaciers. After the blunder in IPCC's Fourth Assessment Report became public as revealed by "The Sunday Times, London", the Noble Prize winning body issued a statement saying that "It has come to our attention that refers to poorly substantiated estimates of rate of recession and date for the disappearance of Himalayan Glaciers. In drafting the paragraph in question, the clear and well established standards of evidence, required by IPCC procedures were not applied properly". R.K. Pachauri, the head of IPCC, whose integrity was questioned by London Telegraph, said that the acceptance of the error "only strengthened the credibility of the global body". Pachauri has previously dismissed criticism of the Himalayas claim as "voodoo science". Just few days back Al Gore admitted similarly a mistake of his own observation that "the latest research showed that the Arctic could be completely ice-free in five years" is not based on science but based on "assumed" information like that of IPCC's.

The UN climate panel faces a new controversy for wrongly linking global warming to a rise in natural disasters such as hurricanes and floods. The link was central to demands at last month Copenhagen climate summit by African nations for compensation of $100 billion from the rich nations blamed for creating the most emissions. The Sunday Times of London has established that the IPCC knew in 2008 that the link could not be proved.

In fact, I myself questioned the IPCC's observation on retreating of Himalayan glaciers in my counter to an editorial in Down To Earth (in which I also pointed out Al Gore's media PR to get Noble Prize), which supposed to be published but Editor of the Down To Earth informed me saying that instead of this article they would are publishing my comments on Polavaram Project - it was published) because just before going to print, Noble Prize was announced to Al Gore & IPCC. I questioned faulty research on climate change as back as 1995 (Agricultural and Forest Meteorology, 77:121-125) and since then at several national & international conferences; more particularly in my book "Climate Change: Myths& Realities - www.scribd.com, 2008 & in the present book also questioned the linking of global warming to natural disasters) To put a full stop to sensationalization of global warming related issues of IPCC & Al Gore, should Al Gore & IPCC return their Noble Prize or the agency should withdraw the Noble Prize conferred on them on its' own??? Let us wait and see still how many such goof-ups will come out!!!

Introduction

General Agriculture Scenario in AP

In Andhra Pradesh (AP) and as well in India more than 60% of population is depending directly and indirectly on agriculture. That is, in India and as well in AP the major employment generating industry is agriculture, though technically speaking agriculture is not considered as an industry. Agriculture is a part of socio-economic-cultural condition of the people in any given area. We must keep in mind such factors while looking into agriculture per se. Let us see some of the factors relating to agriculture sector in AP (**Reddy, 2000 & 2007**).

Cultivated area: Though AP is the rice bowl of India, the farmers' suicides are rampant. The total geographical area of AP is 274.40 lakh hectares of which about 34% is in Coastal Andhra (CA), 24% in Rayalaseema (RS) and 42% in Telangana (TG). The net sown area (average of six years, namely 1984-86, 1989-91 & 1994-96) in AP, it was 39% of its geographical area in which 41% in CA, 40% in RS & 37% in TG. The area cultivated more than once, in a year, was 20% in AP in which 34% in CA, 7% in RS & 15% in TG.

Land-holdings: According to 1995-96 Census there were 106.03 lakh landholdings comprising 143.73 lakh hectares. More than 80% of them come under small and marginal farmers with limited resources. The average land holding in AP was 1.36 ha. With the population growth the area cultivated by a family is fragmented and as a result the landholdings are continuously increasing with the time and thus now the average land holding in AP is far far less than 1.36 ha. With this, more people and more man hours are being wasted in every season in procuring the basic needs for agriculture.

Inputs: Inputs include chemical fertilizers & insecticides-pesticides on the one hand and on the other seeds & credits. In recent years, there was a spurt in adulterated seeds & fertilizers-insecticides-pesticides as there is big money that can be earned instantly (**Reddy, 2003a**). The major problem for the suicides in AP is the private money lenders as small & marginal farmers are highly dependent on such lenders only. These are the major culprits in the production fluctuations even under good weather conditions. **Appendix-I** presents few observations on a report relating to input subsidies issue presented by two professors from IIM Ahemdabad. Though with the increasing population the agriculture output is increasing but there are no in-consummate storage facilities. As a result in each year large part of the produce is destroyed by either rains or by rodents or fire or some other way. This is giving advantage to private businessman to exploit the farmers. Thus, profits are going to businessmen and farmers are left with debts and as a result farmers are taking extreme step of committing suicides.

Table 1: Region-wise & source-wise irrigation potential (in lakh ha) during 1955-56 & 1999-00 in AP

Region/Year		Canals	Tanks	Wells	Others	Total
CA	1955-56	11.38	4.56	0.66	0.63	17.23
	1999-00	12.32	3.79	4.69	1.21	22.01
RS	1955-56	1.03	1.70	1.02	0.06	3.81
	1999-00	1.23	0.44	4.31	0.14	6.12
TG	1955-56	0.51	4.44	1.16	0.34	6.43
	1999-00	2.79	2.28	10.01	0.63	15.71
AP	1955-56	12.29	10.68	2.84	1.03	27.47
	1999-00	16.34	6.51	19.00	1.99	43.84

Irrigated area – source-wise: The net irrigated area increased from 27.67 lakh ha in 1955-58 to 41.26 lakh ha in 2000-03 and the same under gross increased from 33.14 to 50.73 lakh ha. They are 16.60 to 20.38 & 19.41 to 26.31 lakh ha in

CA; 3.67 to 5.97 & 5.03 to 7.42 lakh ha in RS; and 7.40 to 14.91 & 8.70 to 17.00 lakh ha in TG. **Table 1** presents area under different sources of irrigation, namely canals, tanks, wells, bore-wells and others during 1955-56 & 1999-00 at state level as well in the three regions of the state. That means still around 60% of the cultivated area is at the mercy of "Rain God" – rainfed agriculture. In addition, the area under wells & tanks also are at the mercy of Rain God – as they are more particularly depending upon in-situ rainfall. Some irrigation projects under-taken by the government under "Jalayagnam" are yet to be completed to bring more areas under canal irrigation. However, the areas under lift irrigation, to better utilize the costly water & to bring more area under irrigation, micro-irrigation concept is being planned to implement – already such system is in operation in some parts of the state.

Irrigated area – crop-wise: According to 1995-96 statistics, 66% of irrigated area was under Paddy/Rice of which 56% area was under canals, 22% each under tanks & wells; 10% area was under horticulture crops of which 84% area was under wells; 7% area was under groundnut of which 81% area was under wells; 6% area was under sugarcane of which 69% area was under wells; 3% area was under cotton of which 78% area was under wells; 2% each area was under Chilies & Maize of which 83% area was under wells, etc. That means well irrigation was the principal source of irrigation to cash crops along with the 22% of the Rice/Paddy crop needs. This is the green revolution effect. Unfortunately, with the green revolution technology there was a big spurt in the area cultivated by cash crops at high risk as mono crops under high inputs, instead of less risky traditional intercropping/mixed cropping under the highly variable weather. For example, area under groundnut increased from 16.76 ha in 1984-85 to 23.91 ha in 1990-91; the area under cotton increased from 5.54 ha in 1984-85 to 10.59 ha in 1995-96. At the same time the area under traditional

cereal crops such as Sorghum (Jowar) has reduced from 18.62 ha in 1984-85 to 8.53 ha in 1996-97. With this weather related risk increased under dry-land agriculture. With the major shift from inter-cropping/mixed cropping to mono cropping, during 2009-10 crop year AP experienced severe short fall in pulses.

Technology effect on power use: The traditional technology was replaced by green revolution technology in around 1960s. **Table 2** presents pump sets and area cultivated in lakh of ha & **Table 3** presents region-wise pump sets, power use & per pump power use during 1999-00. During 1980-81 to 1999-00 period, the pump sets increased by 3.3 times but during this period the power use increased by as high as 10.2 times. During the same period the area under wells and bore-wells increased by about 1.45 times (7.77 lakh ha to 19.00 lakh ha), which means, per pump the power use increased by 3.1 times and the power used to irrigate one hectare increased by 7 times. This was attributed to indiscriminate pumping of water without proportionately compensating the ground water; that is groundwater is depleting at a faster rate with indiscriminate pumping. Now, with the free-power, farmers replaced low HP motors with high HP motors, the power consumption rate have gone up – misuse of power – as well groundwater is depleting at a faster rate.

Table 2: Pump sets and area cultivated (in lakh ha) in AP

Sector	1980-81	1999-00	Increase (times)
Pump sets, lakhs	4.22	18.21	3.30
Area, lakh ha	7.77	19.00	1.45

Table 3: Region-wise pump sets, power use & per pump power use during 1999-00 in AP

Region	Number of pumps (Lakhs)	Total consumption (Lakh units)	per pump consumption (Units)
CA	03.71	14970	4038
RS	04.27	16080	3769
TG	11.36	68280	6013
AP	19.33	99330	5139

Cooperative farming: The government is planning to implement cooperative farming to overcome some of the problems mentioned above. However, under the pressure from the World Bank, the government introduced two components of corporate agriculture. The first one is handing over the farmers lands to society and farmers in turn gets shares – this system facilitate rich/politicians to control societies and as well the lands hither too under binami names under land-ceiling act or block-money transaction can easily be transfer on their names; and the second one is introduction of mechanization in agriculture – businessmen & politicians rushed to China to negotiate companies to supply necessary machinery, a big business proposal. Farmers are refusing to loose hold on their piece of lands. Machination efficiency in use is around 30% level only and agriculture labourers loose their bread & butter and have to look for another alternative work opportunity. To improve the farmers economic conditions and at the same time help in better utilization of natural resources, the best solution: adaptation of cooperative farming without the two corporate components. With this system it is easy to change from the high subsidized environmentally un-friendly chemical inputs to highly environment friendly organic inputs through the introduction of animal husbandry as part of agriculture.

Climate Change in brief

The two natural resources that are vital in agriculture are land and water. Soil is fixed but water is highly variable both in space and time. The climate change plays vital role on water component and thus plays an important role in agricultural planning. However, this is not moving in the right direction with Western mind set of scientists-bureaucrats-politicians. Now a days every thing has become unusual and try to attribute to something we don't have the comprehensive knowledge like a "blind man using a light pole" not for

enlightening but for support. Most unfortunately, man on the street to Editor of scientific magazines talk of climate change at the same wavelength, and thus the science of climate change became a scapegoat. It became a fashion to speakers at conferences to use the word climate change as an "adjective" to please the audience and fund donors. Thus, the "science of climate change" has turned into a political satire of "global warming & carbon credits" with billions of dollars to share – "Money makes many things and thus from scientist to NGOs looking at Climate change with out understanding the subject as a milking cow".

The science of climate change is a vast subject (**Reddy, 2008**). It has two major components, one is in built in nature, which is beyond human control and thus one has to adapt to them (**Reddy, 1993 & 2002**); and the other one is introduced by man's actions on nature, which is in the hands of humans. The former relates to systematic variations in weather phenomena that repeat itself over periods like Indian Astrological Cycle, which are long- and short- in nature. The long-term variations are known as ice ages seen in temperature (accordingly sea levels and carbon dioxide) running over thousands of years. The short-term fluctuations are seen in precipitation similar to fluctuations seen in extra-terrestrial phenomena such as sunspots & solar flares. The fluctuations in precipitation play vital role on agriculture and water resources that need development of adaptive measures (**Reddy, 1993**) to overcome the risks associated with such fluctuations (see **Appendix-II & III**). By taking into account all such variations, the book briefly summarizes the climate of Andhra Pradesh in the perspective of agriculture scenario.

General Climate

Climate & Weather: The term climate refers to the weather over very long periods, while weather is what we experience daily. World over the systems that cause rain are quite different and so is the case in India and Andhra Pradesh (**Gupta & Reddy, 1999; Reddy, 2002 & 2008**). Indian rainfall is associated with the monsoon systems. It is a fact that the term is used to connote a seasonal wind, which blows with consistency and regularity during a part of the year, and which is absent or blows from another direction for some other part of the year. The former relates to the winds blowing from the Southwest and is termed as the Southwest Monsoon (SWM) around June to September with superimposing May and October. This is also known as Summer Monsoon and Kharif Season. The later relates to the winds blowing from the Northeast and is termed as the Northeast Monsoon (NEM) around October to December/ January. This is also termed as Winter Monsoon and Rabi Season. There are several other weather systems that cause rainfall over Indian region. Among these, the Western Disturbances are of particular importance for the post-rainy season winter crop in Northwestern India. The dependence of the SWM & NEM on the number of cyclones and depressions is very pronounced in the Andhra Pradesh Rainfall. Topography & ecology play important role on Indian rainfall (Western Ghats & Himalayan mountains), which is more so in AP rainfall. These patterns make agricultural practices more complicated and risky.

Average Precipitation: Figure 1 presents the average rainfall amounts at district level both in SWM and NEM in AP. The average rainfall at district level varied from 308 mm in Anantapur district to 985 mm in Khammam district during SWM; and from 79 mm in Adilabad district [80 mm in Nizambad district] to 611 mm in Nellore (Potti Sriramulu) district. **Table 4** presents the averages

and extreme precipitation in the three meteorological sub-divisions of AP. These clearly reflect high spatial and monsoonal-seasonal variations in precipitation.

Drought conditions in 2001 & 2002: Figure 2 presents spatial and temporal variation of precipitation during SWM & NEM in AP in (a) 2001 and (b) 2002. During SWM season in 2001 around 20 districts received normal or above normal precipitation but a reversal of this is seen in 2002, where 16 districts presented deficit precipitation. During NEM season in 2001 around 22 districts received normal and above normal precipitation but a reversal of this were seen in 2002. The same types of monsoon vagaries are reflected in **Fig. 3 (a, b, c & d).**

Table 4: Average rainfall patterns at all-India and in three meteorological sub-divisions of AP

Region	Parameter	SWM	NEM	Annual
All India	Mean, mm	852 (78)	120 (11)	1090
	C.V., %	9.9	29.0	19.5
	The Highest	1020 (120)	210	1348 (124)
	The Lowest	604 (71)	050	811 (74)
Coastal Andhra	(CA) Mean, mm	507 (52)	375 (39)	971
	C.V., %	22.2	38.8	19.8
	The Highest	780 (154)	703	1501 (155)
	The Lowest	309 (61)	88	532 (55)
Rayalaseema (RS)	Mean, mm	422 (60)	204 (29)	709
	C.V., %	28.8	41.9	21.6
	The Highest	791 (187)	455	1228 (173)
	The Lowest	192 (46)	12	226 (32)
Telangana (TG)	Mean, mm	722 (80)	107 (12)	899
	C.V., %	23.5	60.3	21.7
	The Highest	1186 (164)	310	1485 (165)
	The Lowest	371 (51)	2	489 (54)

Note: The value in the bracket in the case of mean column refers to % of annual value; in the case of the highest & the lowest columns refer to % of mean – normal refers to 90 to 110% of mean

Frequency of occurrence of precipitation in different ranges: Figure 3 presents the frequency of occurrence of rainfall in different ranges as % of years during months of (a) June, (b) July, (c) August & (d) September in the three meteorological sub-divisions of AP. It also includes the averages & extreme rainfall amounts and years – H = the highest & L = the lowest —. These histograms clearly demonstrate the way we attribute the changes in the rainfall in different months is not associated with global warming but it is a natural system in built in nature. These estimates are based on the data series 1871 to 1990/1994 from **Parthasarathy et al. (1995)** publication. Later to this period, the data series were taken from IMD publications which may not form the same network averages.

Table 5: The lowest and the highest rainfalls received during June to September in AP

Month	Average monthly Rainfall, mm					
	The Lowest			The Highest		
	CA	RS	TG	CA	RS	TG
June	10.6	25.2	25.5	212.9	196.4	250.5
July	11.1	46.8	58.2	350.6	315.5	495.1
August	7.5	28.5	38.3	349.0	275.0	405.5
September	32.6	58.7	36.4	440.2	322.9	510.7

In the month of June, the Rayalaseema sub-division (RS) receives less than 100 mm only in many years. Coastal Andhra sub-division (CA) also followed this pattern but Telangana sub-division (TG) presented less number of years. That means even in Telangana sub-division only in some years June rainfall is less than 100 mm. It is also clear from the lowest and the highest rainfalls received in June to September months (**Table 5**). The June rainfall in

CA & RS presents skewed distribution on lower rainfall side. The same is the case in July & August in the case of RS and September in CA. The TG rainfall in general presents a spreading over wider ranges, more particularly seen in July, August & September rainfall. This pattern is in built nature over different parts of AP. This may be still wider at district level as this state receives rainfall under two monsoons and that to these are influenced by cyclonic activity in Bay of Bengal.

Rainfall Probabilities: Rainfall probabilities present an insight into crop planning at any given location. However, here one another weather parameter plays an important role, namely evaporation rate that define water requirement under that weather conditions. **Table 6** presents probabilities of receiving at least 10 mm/week at few selected locations during June to October & also includes the dependable precipitation (at 75% probability level) at four weekly intervals for the few selected stations. All these show the present day variations in rainfall patterns form part of in-built variations in nature but unfortunately present day groups "addicted to climate change" attributing to global warming.

Table 6: Probability estimates at few selected stations in AP

Week No.	Hyderabad	Anantapur	Kurnool	Kadapa	Chittoor
20	19	34	25	26	44
21	36/23.5*	46/29.1	28/28.9	33	56
22	30	46	35	36	44
23	38	49	51	53	50
24	49	17	41	41	28
25	68/86.6	22/13.9	55/48.7	43	50
26	77	39	58	49	44
27	71	22	57	49	28
28	72	29	64	46	50
29	72/96.4	39/15.7	71/69.0	54	50
30	81	31	75	56	44
31	84	41	70	51	33
32	64	20	55	50	50

33	64//81.8	41/30.2	57/51.7	56	44
34	59	41	59	54	61
35	75	39	54	56	50
36	74	47	51	57	39
37	65/73.6	47/64.6	57/60.5	56	61
38	74	61	71	60	56
39	61	64	67	63	56
40	39	64	48	53	67
41	42/14.6	58/26.5	45/22.4	54	67
42	35	41	46	53	61
43	29	39	33	49	61
44	25	39	29	54	44
45	25/02.2	32/05.8	25/02.4	41	44
46	10	25	09	41	39
47	16	22	09	34	56
48	04	12	09	21	56

*36/23.5 = (probability of receiving at least 10 mm/week) / (Precipitation expected at 75% probability level in mm/4-week periods) – Virmani et al. (1978), Reddy & Virmani (1978)
Week No. 21 = May 21-27; Week No. 25 = June 18-24; Week No. 29 = July 16-22; Week No. 33 = August13-19; Week No. 37 = September 10-16; Week No. 41 = October 8-14; Week No. 45 = November 5-11

Systematic Variations in Precipitation

General: Systematic variations are known as rhythms or fluctuations or cycles that repeat itself with the time like 60-year Telugu astrological calendar. The observed cycles in meteorological parameters are of two types, namely long-term cycles and short-term cycles. The long-term cycles are also known as ice ages. These are cycles seen in temperature running into thousands of years. The sea temperature, sea levels & carbon dioxide concentrations in the atmosphere present such patterns. The short term cycles are seen precipitation, temperature as well in extra-terrestrial phenomena (**King, 1975**) such as solar flares & sunspots – 11-year cycle & 22-year double sunspot cycle. La Nino & El Nino form part of short-term temperature cycles, which are seen in USA zone.

Rhythms in Precipitation: The author studied the precipitation data series of several countries (**Reddy, 1993**). The longest cycle observed was of 66-year cycle in Durban rainfall data series in South Africa – the same was also observed in sediment data (paleo-climatological study) series of Canberra in Australia. The shortest cycle of 22-years was observed in Asmara in Eritrea – formerly in Ethiopia —, which was also observed in sunspots & solar flares known as double sunspot cycle (**Reddy, 2008**). The dates of onset data series over Kerala Coast in India presented a 52 year cycle similar to that of Fortaleza precipitation in Brazil. Catuane precipitation in Mozambique presented a 54 year cycle, Mahalapye precipitation in Botswana presented 60 year cycle (**Reddy, 1993**).

Rhythm in all-India SWM precipitation: The all-India SWM rainfall forms 78% of the annual rainfall. This rainfall series presented a 60 year cycle similar to that of Indian Astrological cycle (**Figure 4a**). The data series show that two cycles have been completed and the third cycle started in 1987-88 (Prabhava) and will continue up to 2046-47 (Axsaya). The cycle is a sine curve. The first 30 years form better rainfall period and the next 30 year period form a poor rainfall period. During the former the floods are more and droughts are less. The vice versa is the case in the later. In the figure, the 90% & 110% of mean precipitation lines along with mean precipitation line are shown. The years with precipitation less than 90% of average rainfall is counted as drought years; and the years with the precipitation more than 110% of average rainfall is counted as flood years.

Rhythms vs droughts & floods: **Figure 4a** also presents the number of years in the 30-year periods less than 90% and more than 100% of the mean along with the mean precipitation. **Table 7** presents the average rainfall and years with less than 90% of the mean/average rainfall in each 30-year cycle

period. **Table 8** presents the frequency of occurrence of floods in few selected northwestern India. These two tables demonstrate floods and droughts are associated to natural in built climate cycle in nature and not in any way are associated with global warming, which is of very recent in nature and that too very little increase in temperature (less than 0.5 degrees Celsius) that may not have the capacity to influence the weather system. We all know the fact that year to year variations in temperatures vary as high as 2 to 5 degrees Celsius. Even in USA it was observed such high variations with reference to La Nino and El Nino periods.

Table 7: The average rainfall & the number of years the rainfall is less than 90% of average all-India SWM rainfall in 30-year cycle parts of 60-year cycle

Period	30-year mean (mm)	No. of years below the normal	Cycle part
1871-00	865.9	3	Above the average part
1901-30	827.3	6	Below the average part
1931-60	877.5	2	Above the average part
1961-90	838.2	10	Below the average part
1991-20		Nil*	Above the average part

* up to now only, we may expect 2 to 3 years by 2020.

Rhythms in annual Precipitation of AP: The annual rainfall data series of AP presented 132 year cycle (**Fig. 4b**). Here under below the average 66 years cycle period the annual rainfall was less than 90% of the average in 24 years and more than 110% of the average in 12 years. They are, respectively, 12 and 24 in the case of above the average 66 years cycle period (**Table 9**), exactly opposite to the previous cycle part. **Figure 5 (a, b & c)** presents the annual rainfall pattern of three meteorological sub-divisions of AP that includes 132 year cycle pattern. In these figures also presented 56-year cycle pattern. It is clear from these figures that the annual precipitation data do not fit into 56-year

cycle. **Table 9** also includes number of years in 66 year cycle part the precipitation is less than 90% and more than 110% of mean/average for the three meteorological sub-divisions.

Table 8: Frequency of occurrence of floods in few rivers in Northwest India in the 60-year cycle part of 60-year cycle of all-India SWM rainfall

Frequency of high magnitude floods			
River	**Year**	**Frequency**	**Climatic cycle**
Chenab	1962-1990	1 in 9 years	(a) Below the average cycle
	1990-1998	1 in 3 years	(b) Above the average cycle
Ravi	1963-1990	1 in 14 years	(a)
	1990-1998	1 in 3 years	(b)
Beas	1941-1990	1 in 8 years	(a)
	1990-1995	1 in 2 years	(b)

Table 9: Number of years the precipitation less than 90% and more than 110% of mean annual precipitation in 66-years periods in AP

% of Mean Precipitation	**Number of years of annual precipitation of 66-years cycle**							
	Below the average cycle				**Above the average cycle**			
	AP	**CA**	**RS**	**TG**	**AP**	**CA**	**RS**	**TG**
< 90	24	26	24	31	12	17	14	19
> 110	12	18	17	16	24	23	30	23

Rhythms in seasonal precipitation of AP: Figure 6 (a, b & c) presents 10-year moving average patterns of SWM & NEM rainfall in the three meteorological sub-divisions of AP. These patterns followed 56-year cycle, though annual rainfall showed 132 year cycle. However, the 56-years cyclic patterns of SWM and NEM presents exactly opposite pattern. **Figure 7** presents the annual march of precipitation in SWM in the three meteorological sub-divisions of AP along with the 56-years cycle pattern. The figure also included

the 132 years cycle pattern. The data series do not fit into 132 years cycle pattern. The number of years less than 90% of average during below the average and more than 110% of average during above the average in SWM precipitation in the three sub-divisions in 28-years cycle periods are presented in **Table 10**.

Table 10: Number of years the precipitation less than 90% and more than 110% of mean SWM precipitation in 28-years periods in AP

Number of years of annual precipitation of 28-years cycle part % of Mean Precipitation					
< 90%			**> 110%**		
Below the average cycle			**Above the average cycle**		
CA	**RS**	**TG**	**CA**	**RS**	**TG**
13	11	13	16	16	15
20	22	19	18	16	20
12	13	11			

Rhythms in annual precipitation vs seasonal precipitation in AP: It is clear from **Figs. 4b to 7** that in AP as the SWM precipitation presented opposite pattern to NEM precipitation, the cycles at seasonal level and annual level presented quite different patterns. Seasonal precipitation followed 56-years cycle and annual precipitation followed 132 years cycle.

To get a meaningful results it is imperative to study the data series in a wide varieties of ways but not restricted to some thing and come to a wrong conclusions, which have severe repercussions to national economy. We must not forget that the precipitation patterns within the country and regions, depending up on several local conditions, present different patterns. Andhra Pradesh receives rainfall during two monsoon systems and that too associated with cyclonic activity. These influence different parts of the state differently and in different seasons. These are clearly reflected in the systematic variation patterns in precipitation. As a result, for non-meteorological groups with little weather knowledge, it looks unusual and thus attribute to global warming.

Trend in Precipitation

We have seen the natural in built patterns in precipitation but the changes in land use and land cover which are known as ecological changes also cause changes to such system. Ecological changes include urbanization, deforestation-reforestation, mining, road networks, changes in agriculture & establishment of reservoirs, etc. Similar to heat-island effect in urban areas, cold-island effect is caused in rural areas with changed agriculture patterns along with building of new water resources. Under this not only temperature is affected at local/regional levels but also precipitation pattern, evaporation rate pattern, wind pattern. However, local topography plays an important role here. All these play important role in agriculture. These are expressed in terms of increasing or decreasing trend. **WMO (1966)** presented a methodology to separate trend from systematic variations.

Unfortunately, many a times, scientists as well media/common man are attributing such variations to global warming, though they are observed at local and regional level. In AP majority of agriculture researchers are playing this game and as a part of this they are also using spurious models and trying to predict the yield impact with global warming, which is a dangerous trend. The same was carried out at international level prior to 2000, wherein they started attributing that in developing countries yield is expected to fall by 6% and in developed world the yield is going to increased by around 15%.

The fact is that in tropical countries, where most of the developing countries are located, temperature is not a limiting factor but moisture is the limiting factor; and vice-versa is the case in the extra-tropical countries, where most of the developed countries are located. In tropical countries the crop varieties are chosen according to the prevailing temperature regime with a

tolerance margins. With the rhythms in precipitation, the evaporation rate, that is water requirement changes

Figure 8 presents the patterns of segments (28 years periods) average precipitation during SWM & NEM in the three meteorological sub-visions. This figure clearly indicates the increasing trends in precipitation in the three meteorological sub-divisions of AP. The trend is more prominently seen in Telangana and Coastal Andhra sub-divisional rainfalls. These are reflected in drought and flood years change with the time (**Table 10)** — in the 2nd 28-years period the number of flood years are around 15 to 16 and in the 4th 28-years period they are 16 to 20; in the 3rd 28-years period the number of drought years are around 19 to 22; and 5th 28-years period the number of drought years are around 11 to 13. These are also seen more clearly in **Figs. 6 & 7**.

Here we must note that the data series generated prior to 1990 are different from those after 1990. That is, the means were generated based on different rainfall stations. The sudden increase seen in **Fig. 6** may be associated with such change in data sets but **Fig. 8** clearly demonstrates the linear increasing tendency in rainfall. Therefore the observed increasing trend seen in AP rainfall is more in association with local ecological changes such as changes in agriculture pattern (dry-land to wet-land; greenery for a longer period) and building-up of large reservoirs for power production & irrigation since 1850s and nothing to do with global warming, which is a recent one that too rise in temperature is not that much to cause changes in weather circulation patterns on the one hand and on the other differentially over different parts of AP. Thus, quantification of trend in space and time help in agriculture and water resources planning at local level.

In such analyses the stations used must be the same for longer period. Such data series help in characterizing the systematic variations as well trend

in precipitation at local and regional levels. Such way it is easy to characterize the variations, whether they are associated with ecological changes or with global warming associated with changes in greenhouse gases. This will provide a means to build long-term agriculture planning strategies at local level.

Dry-land Agriculture Perspective

By integrating the weather & climate in agriculture perspective give clear insight of expected situation on long-term to perspective for formulating farming system strategies for different zones-places. **Figure 9** presents the risks associated with (a) planting hazard and (b) drought hazard in the semi-arid tropical India. The planting hazard (ä) was defined as the standard deviation of commencement time of planting rains (S) and drought risk (A) as the % of years the available effective rainy period (G) is less than or equal to 5 weeks (**Reddy, 1993**).

Table 11: Agroclimatic variables at few selected stations in AP

Station	**S ± δ**	**G ± C**	**A**
Hyderabad	28.2 ± 2.9	12.9 ± 45	13
Visakhapatnam	27.9 ± 4.4	16.7 ± 50	14
Ongole	33.3 ± 5.6	11.2 ± 58	24
Kadapa	32.0 ± 5.1	10.3 ± 71	30
Chittoor	32.1 ± 5.0	08.9 ± 92	44
Kurnool	32.0 ± 4.5	06.1 ± 97	45
Anantapur	36.5 ± 4.8	05.2 ± 104	52
Bellary*	36.9 ± 3.7	05.0 ± 118	60

S ± δ = average planting rains, week number ± standard deviation of planting rains, number of weeks (planting risk); G ± C = average available effective rainy period, number of weeks ± coefficient of variation of available effective rainy period in %; and A = % number of years the available effective rainy period is less than or equal to 5 weeks (drought risk)

Figure 10 presents the drought risk at few selected stations in AP along with other agroclimatic variables. Some of these **S, G,** & A at few selected stations

are also given in **Table 11,** where **S** is the average of yearly S values and **G** is the average of yearly G values.. These results show high spatial variation and thus high spatial distribution of agriculture risk patterns.

Impact of fluctuations on agriculture

Figure 11 presents the temporal variation of commencement time of planting rains (S) and available effective rainy period (G) superposed on them 56-year cycle for (a) Kurnool, (b) Hyderabad & (c) Kadapa. The values of S refer to January 1 to 7 is considered as week no.1 and so on to December 24 to 31 as week no. 52. In these figures the top diagram presents the annual pattern of commencement time of planting rains (S) with reference to average (**S**) and bottom diagram presents the annual pattern of available effective rainy period (G) with reference to average (**G**). The 56-years cycle observed in SWM rainfall patterns seen in **Fig. 7** are presented in **Fig. 11** for the bottom diagram and NEM pattern for top diagram.

In these figures, when G pattern is below the average (available effective rainy period is less than average – possibility of getting more drought years) the corresponding S pattern presents above the average (late commencement in planting rains – possibility of high planting risk) – giving double drought effect — and vice-versa in above the average cycle pattern in S & G. However, Kadapa being at transition point of SWM & NEM rainfall impact zones, presented a slight change in 56-year cycle – small sine curve at the transition of 28-year cycle parts. Therefore, we must study carefully all aspects that influence the rainfall at any given location and then only we get correct picture on long term changes in precipitation.

This type of information play vital role in crop-crop system planning to minimize drought & flooding risks. After the introduction of green revolution technology farmers of Andhra Pradesh are not interested to follow any such

strategy as they are interested to plant those crops that fetch them profits irrespective of rainfall patterns. In this, unfortunately, neither government nor the scientists took interest to impress up on the farmers on dangers associated with such a system of cropping. With this, the drought & flood risks have increased and as a result every year-season farmers started looking for government to pay compensation for crop failure. With this public money is mis-used for faulty planning on the part of farmers and as well on the part of government & scientists. If farmers of AP want to achieve sustainability in agricultural production, there is a need to change their mind set.

Impact of soil types on agriculture

The other important natural resource that plays an important role in agriculture is the soil. There are several types of soils in Andhra Pradesh. Crop production point of view the important character of soil is the water holding capacity (AWC). By integrating climate with soil gives better insight into the drought risk (**Williams et al, 1985**). The water balance studies also include the other important weather parameter that play vital role at any given point is evaporation rate, that define the water need under given climatic conditions.

Figure12 presents the soil water balance simulation results of Kurnool and Anantapur in AP (a) probabilities at 30, 50 & 70% level in terms of actual evapotranspiration (AE) relative to potential evaporation (E) & mean cumulative runoff and (b) average soil water balance at weekly interval under different soil types and planting dates – crop duration. In these figures AWC = 200 mm refers to Vertosols – deep black soils –; and AWC = 50 or 100 mm refers to Alfisols – medium to deep red soils —. The histograms presented in the figures refer to crop water requirement at different stages. The AE/E curves at three probability levels are superposed on these histograms. If the probability curve of AE/E

falls above the histogram, means that duration crop is sustainable/successful in more than that probability level. The results are based on the analysis of daily precipitation data of individual years.

In the case of **(Figure 12a)** Anantapur, in Alfisols with AWC = 100 mm planted at S = 35th week, a 125 duration crop is successful at 30% probability level only. That means the crop is successfully grown one in three years. The same in the case of Vortisols of AWC = 200 mm is successful at around 50% probability level. That is crop is successfully grown once in two years. In the case of Kurnool, they are respectively 30% for AWC = 50 mm and around 70% for AWC = 200 mm. The average value of A for Anantapur is 52% and for Kurnool it is 45%. These figures clearly demonstrate the role of soil in the success and failure of crops/cropping system under a given weather condition. The top diagram indicates the mean runoff condition at weekly interval. This provides a means of flooding condition at that location.

The soil moisture curves (**Figure 12b**) for Anantapur & Kurnool present quite different on the one hand and soil to soil on the other hand. This information is helpful in advance planning of planting time. By separating the data series into periods of below the average and above the average cycle parts give clear picture on the success and failure of crops and as well flooding in different soil conditions. Based on such information farming system practices could be defined as well choice of input that protects the farmer from debts & suicides.

Summary & Conclusions

Every body looks at droughts & floods (**Reddy, 2003b**; **Appendix-V**) as a commodity for profit making. With this, most unfortunately from scientists to bureaucrats-politicians-farmers leaders and farmers are more interested to

get compensation rather than adapting a farming strategy to combat drought and floods to the prevailing weather conditions. Here the governments are not looking at scientific assessments of floods and droughts but going by political considerations. This is a bad practice and thereby mis-use of public funds (**Reddy, 2003b**). In this only small component reaches the farmer. Scientific organizations may conduct conferences & symposiums and enjoy for a day or two and forget every thing. Such events carry weight in their promotions but serve very little. Therefore there is a need to give top priority to practical aspects.

In the case of drought, the government can establish a scientific procedure starting from planting to harvest. This will provide mid-season corrections or going for alternatives. One of the components is monitoring of soil water balance in the soil at weekly interval or 10-day interval. At the end of the season, the bulletin provides the production information. — I my self executed such a system in Mozambique & Ethiopia (**Reddy, 1993**). In the case of Mozambique, Hon'ble Prime Minister impressed with the bulletins and asked his office to circulate the bulletins to all departments. In the case of Ethiopia, three Ministers associated with agriculture were associated with the system. — At state secretariat level a permanent body with a clear cut setup to monitor and coordinate drought must be established. This body must consist of technical personnel in different fields of agriculture. This must be a permanent body and must report directly to Chief Minister through Minister of Agriculture.

In the case of floods there is a need to maintain & monitor the river flows and utilization of water in the reservoirs. Here officials from irrigation department, IMD and CWC must closely work on day to day basis during rainy season, whether there is a cyclonic activity or not. By this way it is possible to reduce the mis-use of water and take appropriate remedial measures during crisis. The concerned officials sitting in Hyderabad will not do well to such

process in right time. During 2009 crisis was associated with weak coordination among IMD, CWC and government departments. Therefore, the government must see that these officials stay at their posts. Also, at state secretariat level a permanent body with a clear cut setup to monitor and coordinate floods on day to day basis must be established. This must be a permanent body and must report directly to Chief Minister through Major Irrigation Minister.

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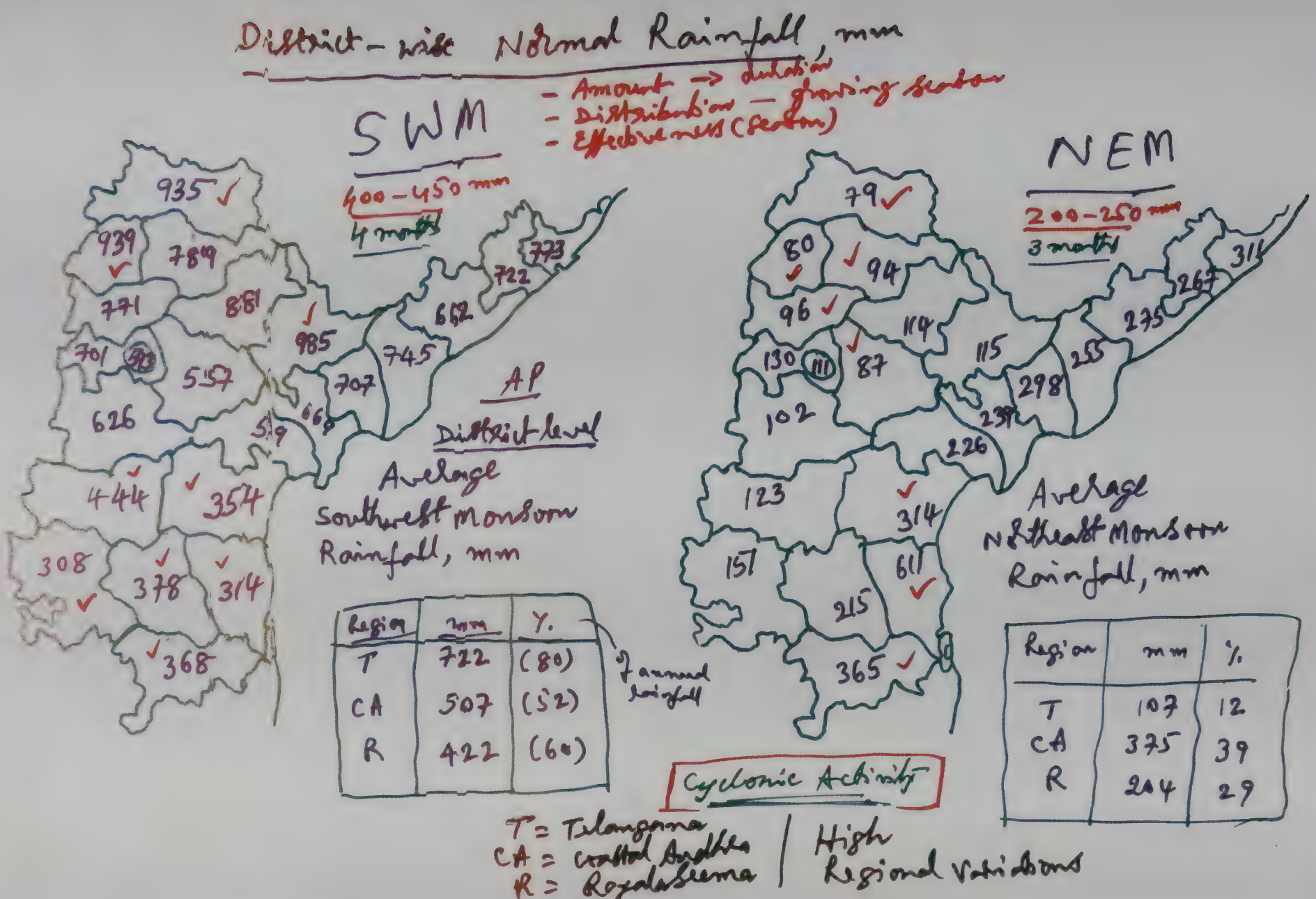

Fig -1: District-wise average SWM & NEW Rainfall in Andhra Pradesh.

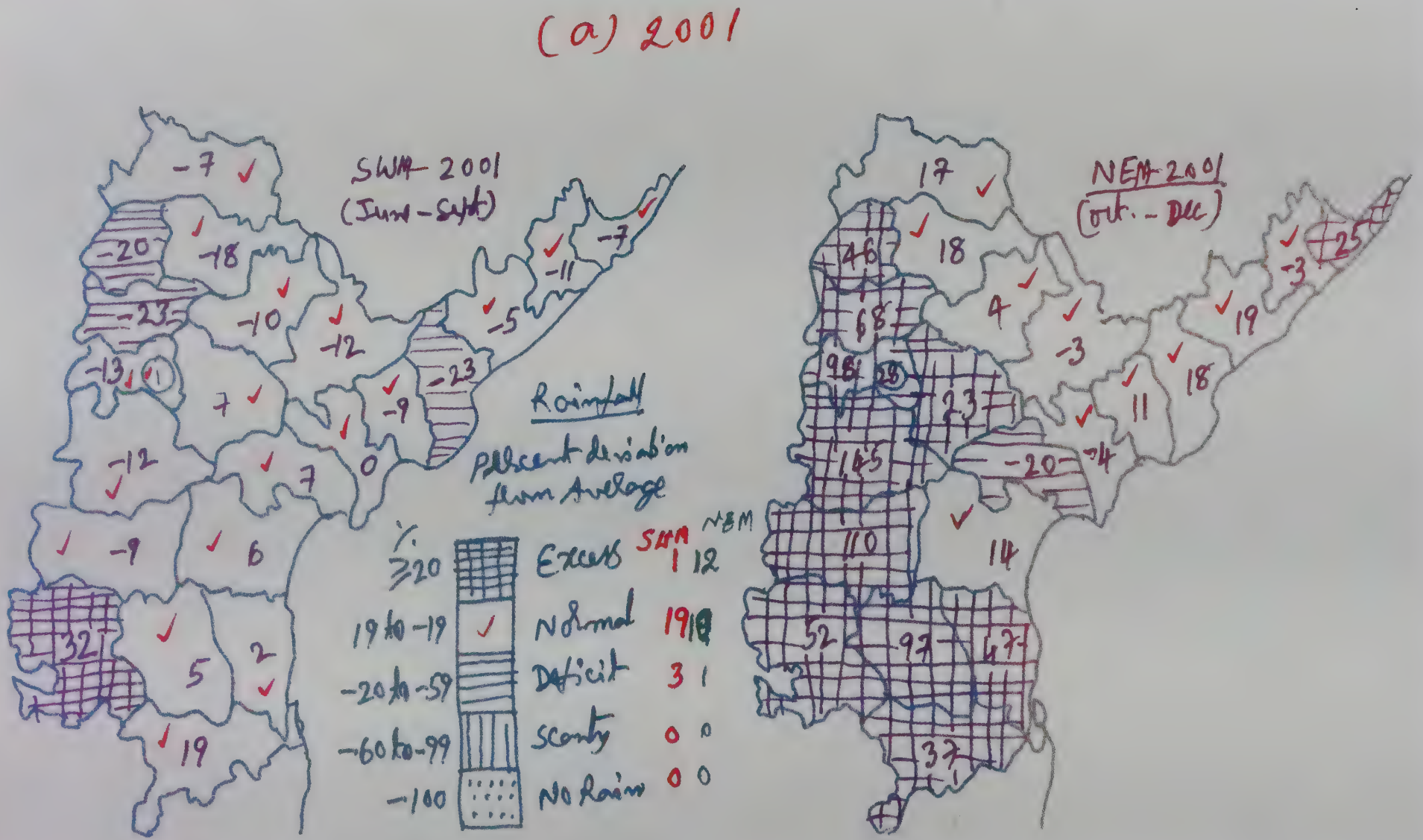

Fig - 2: Spatial & temporal rainfall variations in AP during SWM & NEM in (a) 2001 & (b) 2002.

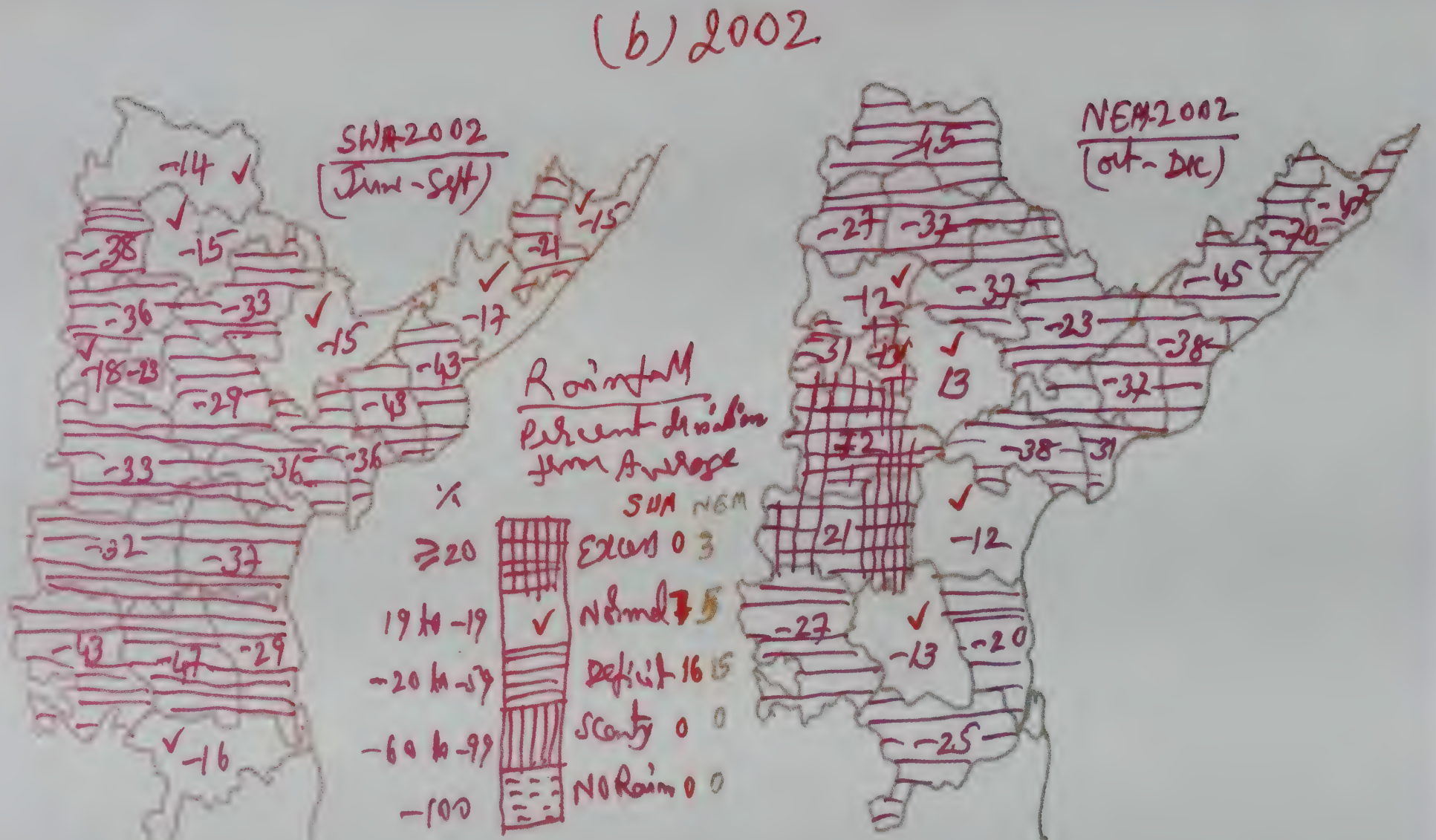
(b) 2002
SWM 2002
(June - Sept)
NEM 2002
(Oct - Dec)
Rainfall
Percent deviation
from Average
%
SWM NEM
≥20 Excess 0 3
19 to -19 Normal 75
-20 to -59 Deficit 16 15
-60 to -99 Scanty 0 0
-100 No Rain 0 0

Fig - 2: contd..

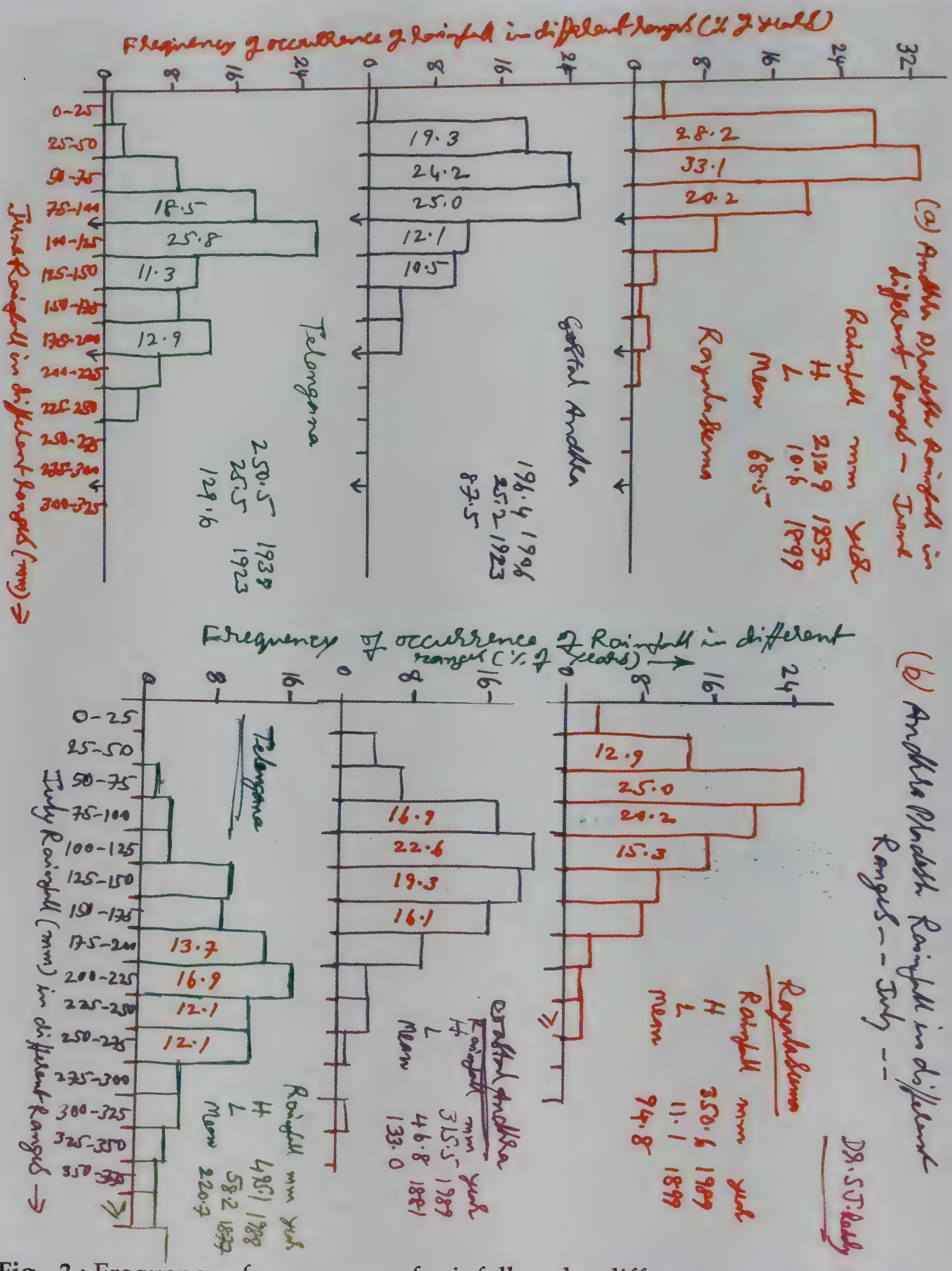

Fig - 3 : Frequency of occurrence of rainfall under different ranges in the three meteorological sub-divisions of AP in (a) June, (b) July, (c) August & (d) September months

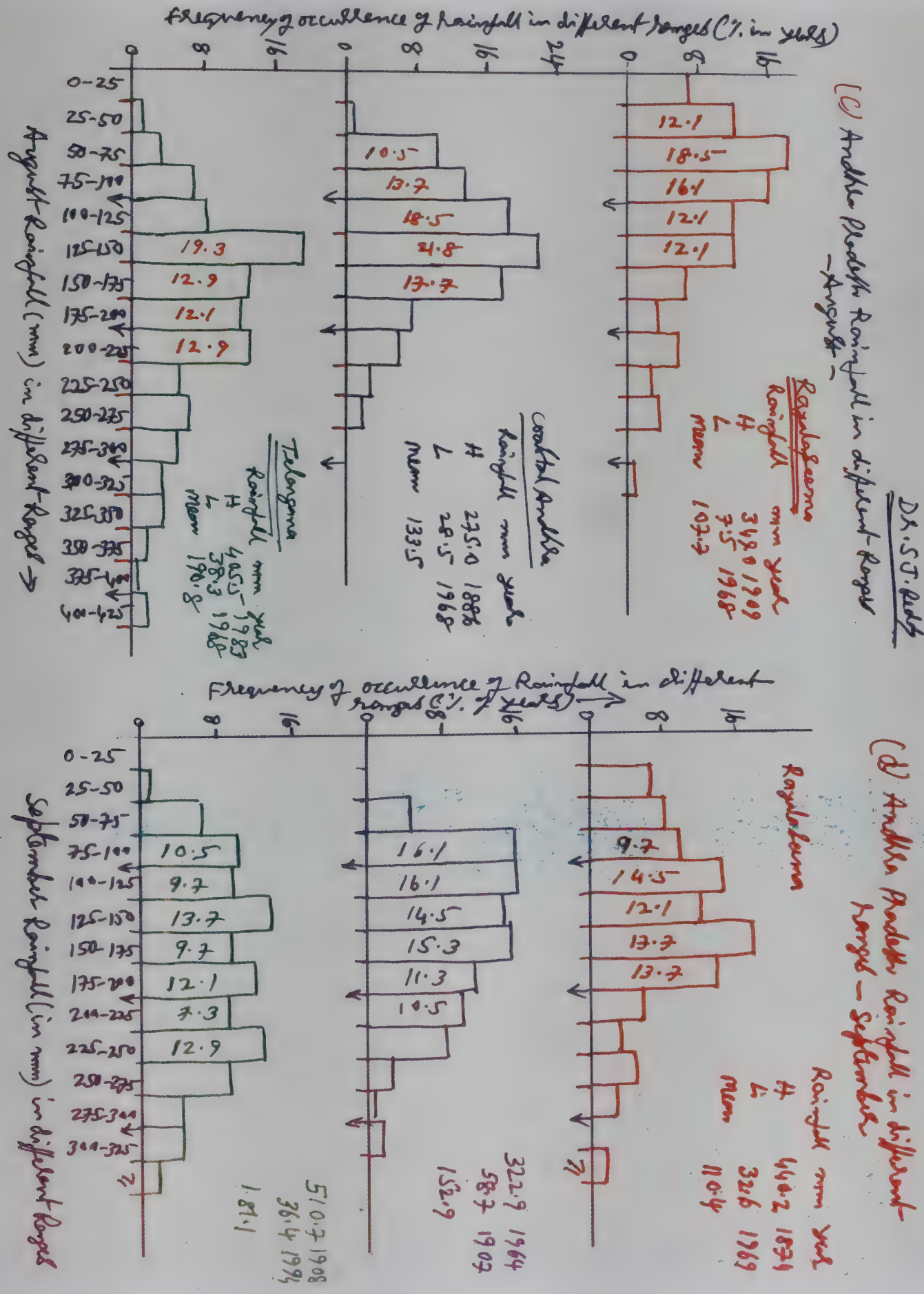
(c) Andhra Pradesh Rainfall in different Ranges – August –
Dr. S.T. Reddy
Frequency of occurrence of Rainfall in different ranges (% in years)
August Rainfall (mm) in different Ranges →
0-25
25-50
50-75
75-100
100-125
125-150
150-175
175-200
200-225
225-250
250-275
275-300
300-325
325-350
350-375
375-400
400-425
Rayalaseema
Rainfall mm year
H 340 1909
L 7.5 1968
Mean 102.9
12.1
18.5
16.1
12.1
12.1
Coastal Andhra
Rainfall mm years
H 275.0 1886
L 28.5 1968
Mean 133.5
10.5
13.7
18.5
24.8
17.7
Telangana
Rainfall mm year
H 405.5 1983
L 38.3 1968
Mean 190.8
19.3
12.9
12.1
12.9
(d) Andhra Pradesh Rainfall in different ranges – September
Frequency of occurrence of Rainfall in different ranges (% of years) →
September Rainfall (in mm) in different Ranges
Rayalaseema
Rainfall mm year
H 440.2 1934
L 32.6 1969
Mean 110.4
9.7
14.5
12.1
13.7
13.7
Coastal Andhra
H 322.9 1964
L 58.7 1907
152.9
16.1
16.1
14.5
15.3
11.3
10.5
Telangana
H 510.7 1908
L 36.4 1994
181.1
10.5
9.7
13.7
9.7
12.1
7.3
12.9

Fig - 3 contd..

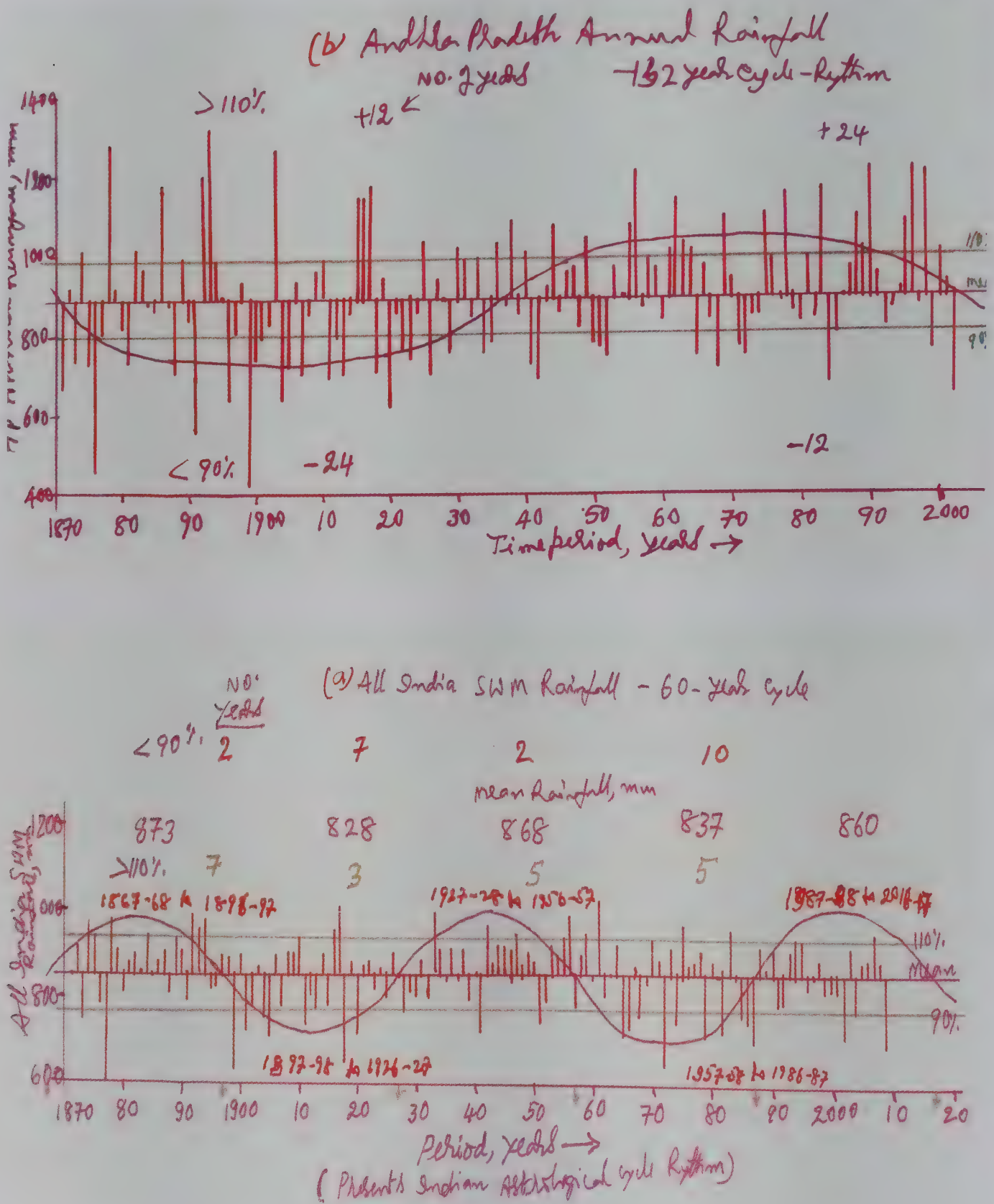

Fig - 4: Fluctuations in (a) all India SWM rainfall and (b) annual rainfall of AP

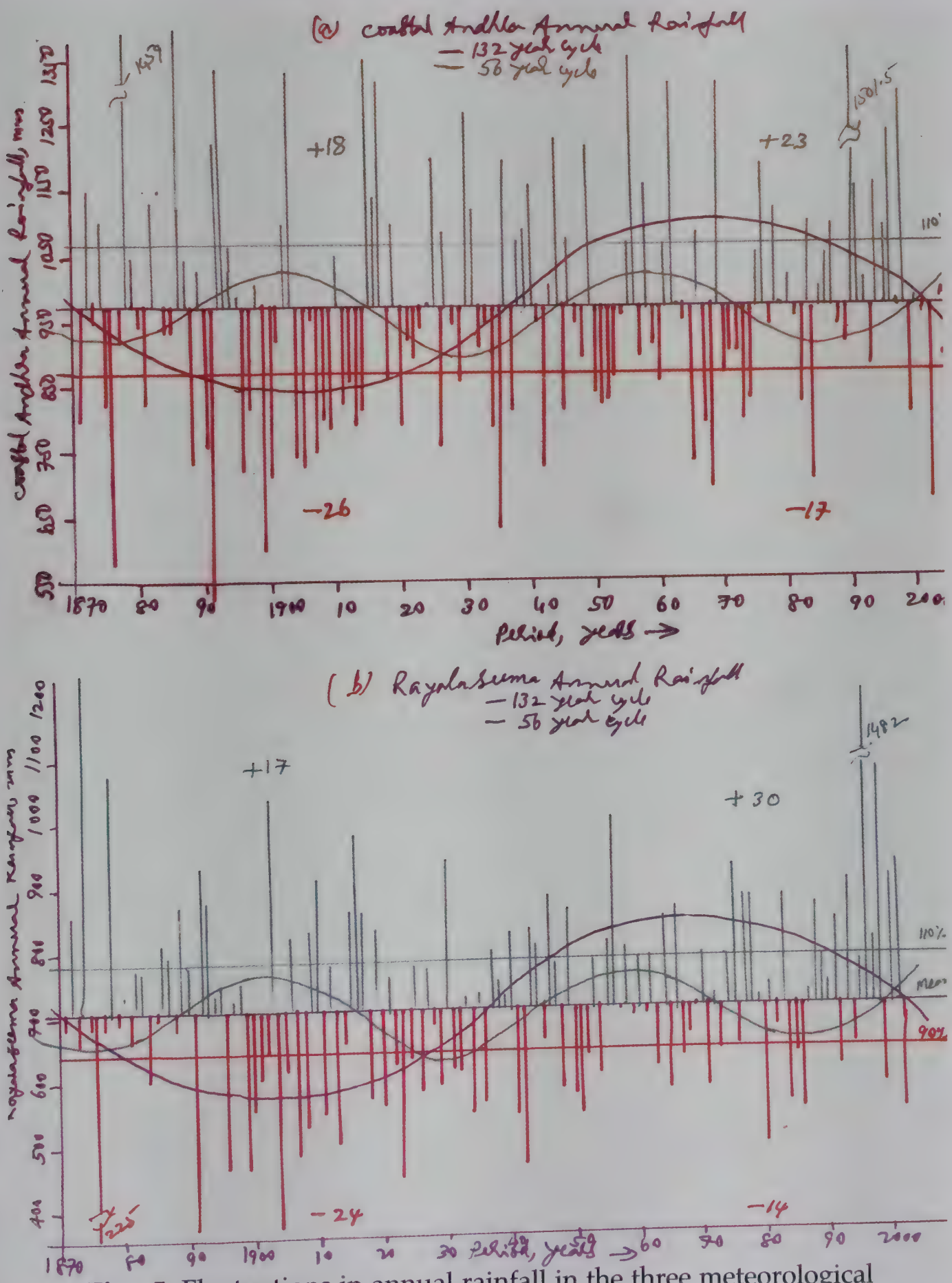

Fig - 5: Fluctuations in annual rainfall in the three meteorological sub-divisions of AP

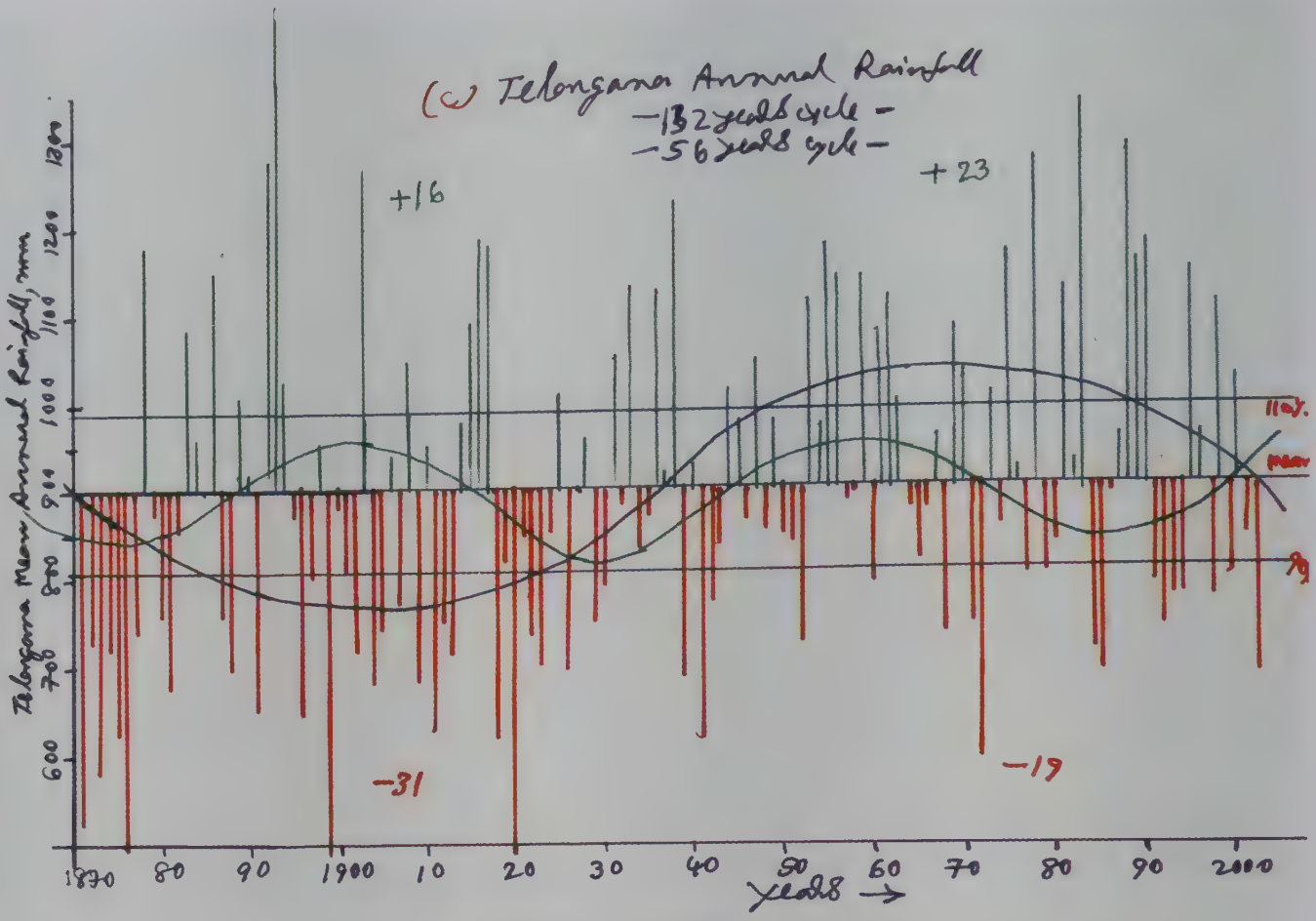

Fig - 5 contd...

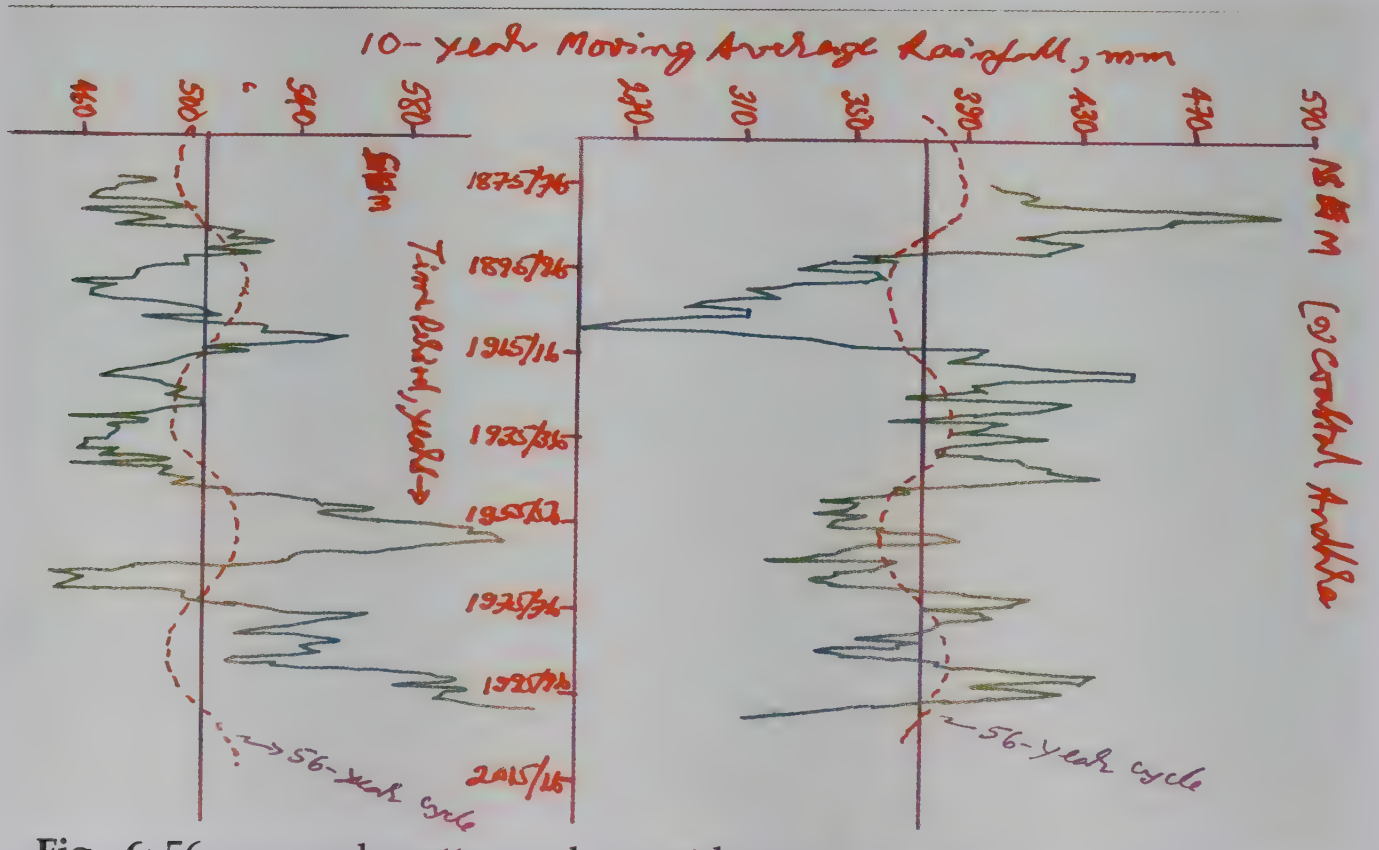

Fig - 6: 56-year cycle patterns along with 10-year moving average patterns during SWM & NEM in three meteorological sub-divisions of AP

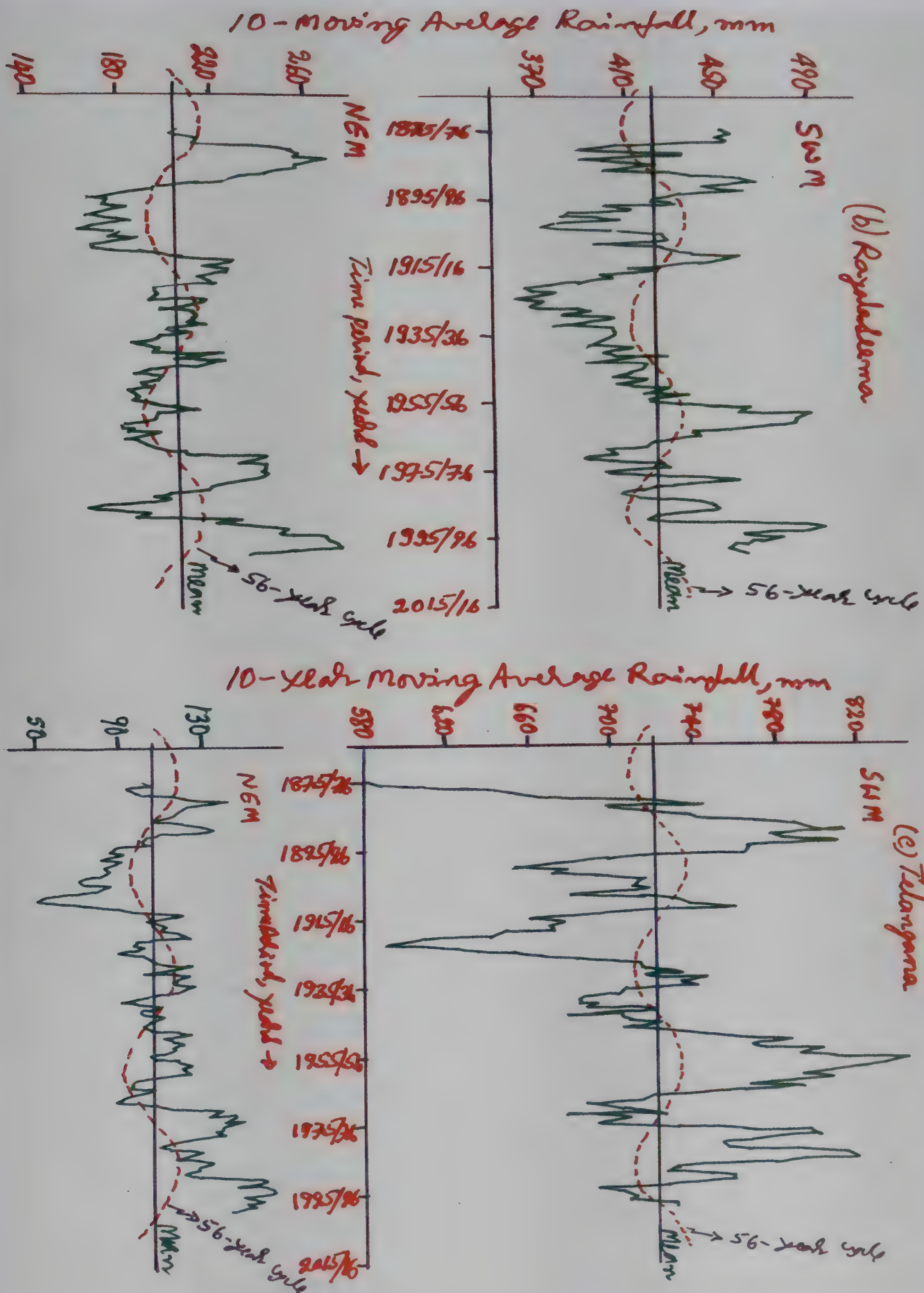
10-Moving Average Rainfall, mm
140
180
220
260
NEM
370
410
450
490
SWM
(b) Rayalaseema
1875/76
1895/96
1915/16
1935/36
1955/56
1975/76
1995/96
2015/16
Time behind, years
Mean
56-year cycle
10-year Moving Average Rainfall, mm
50
90
130
NEM
580
620
660
700
740
780
820
SWM
(c) Telangana
1875/76
1895/96
1915/16
1935/36
1955/56
1975/76
1995/96
2015/16
Time behind, years
Mean
56-year cycle

Fig - 6: Contd...

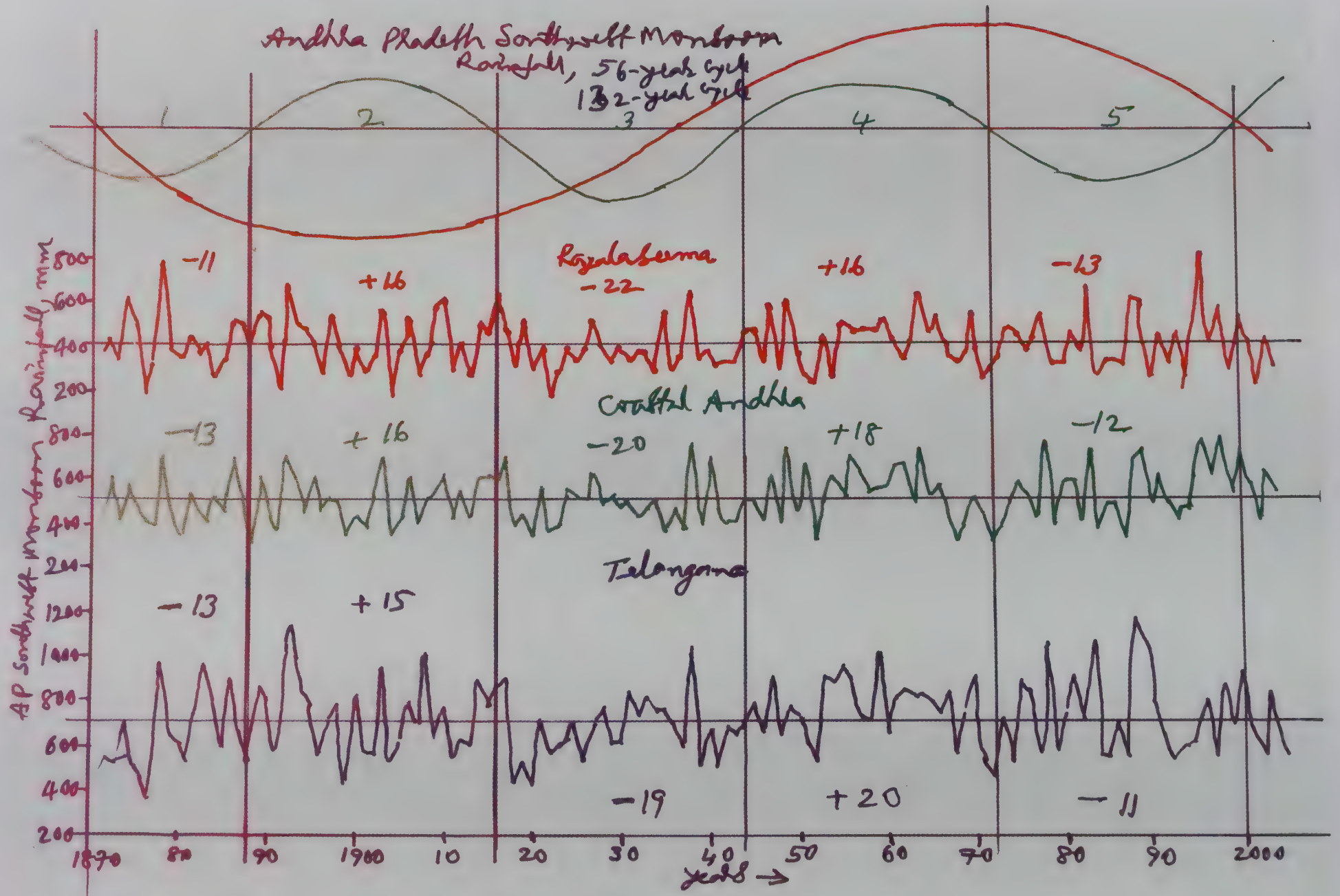

Fig - 7: Fluctuations in SWM rainfall in the three meteorological sub-divisions of AP

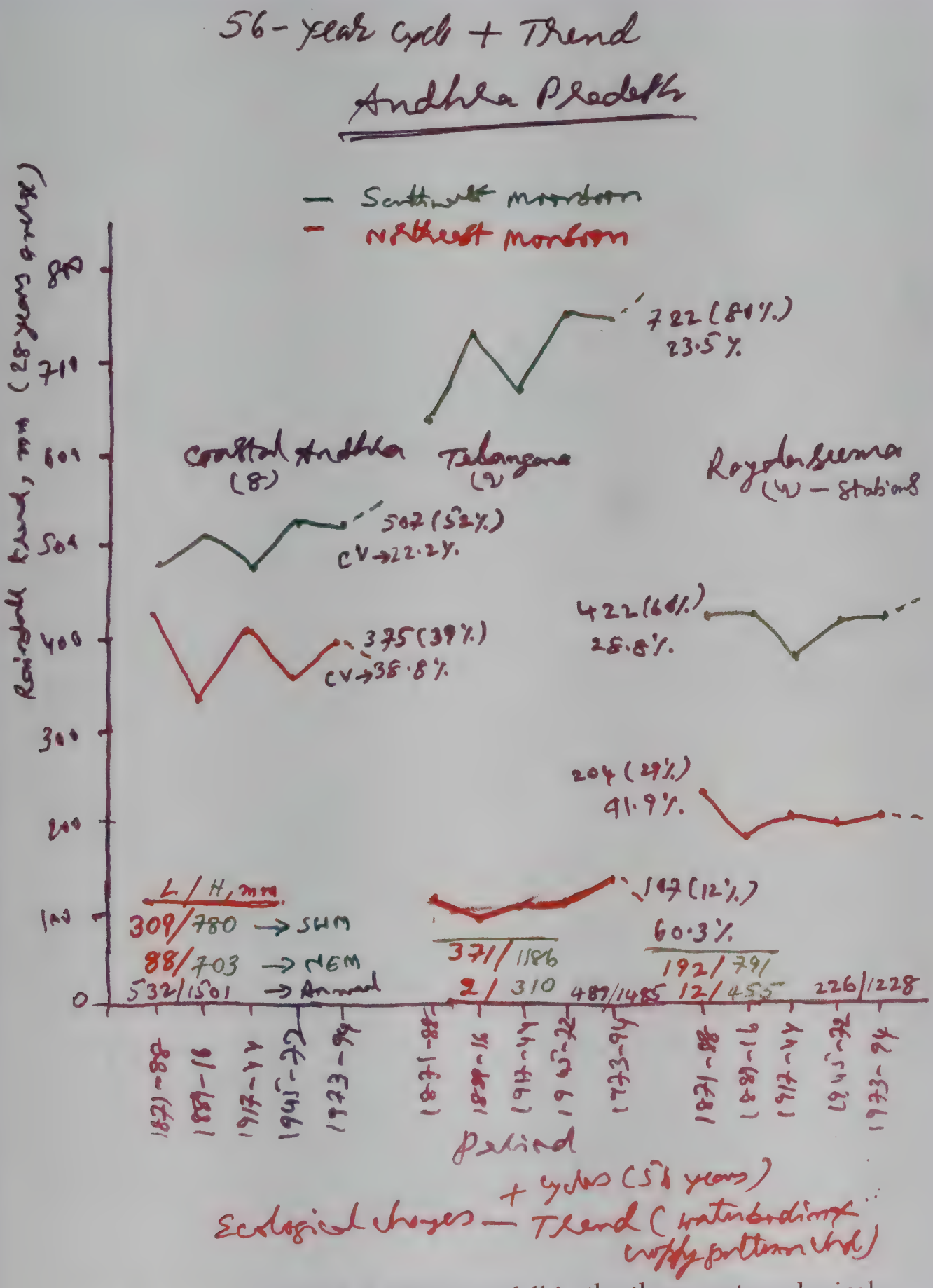

Fig - 8: Trend in SWM & NEM rainfall in the three meteorological sub-divisions of AP

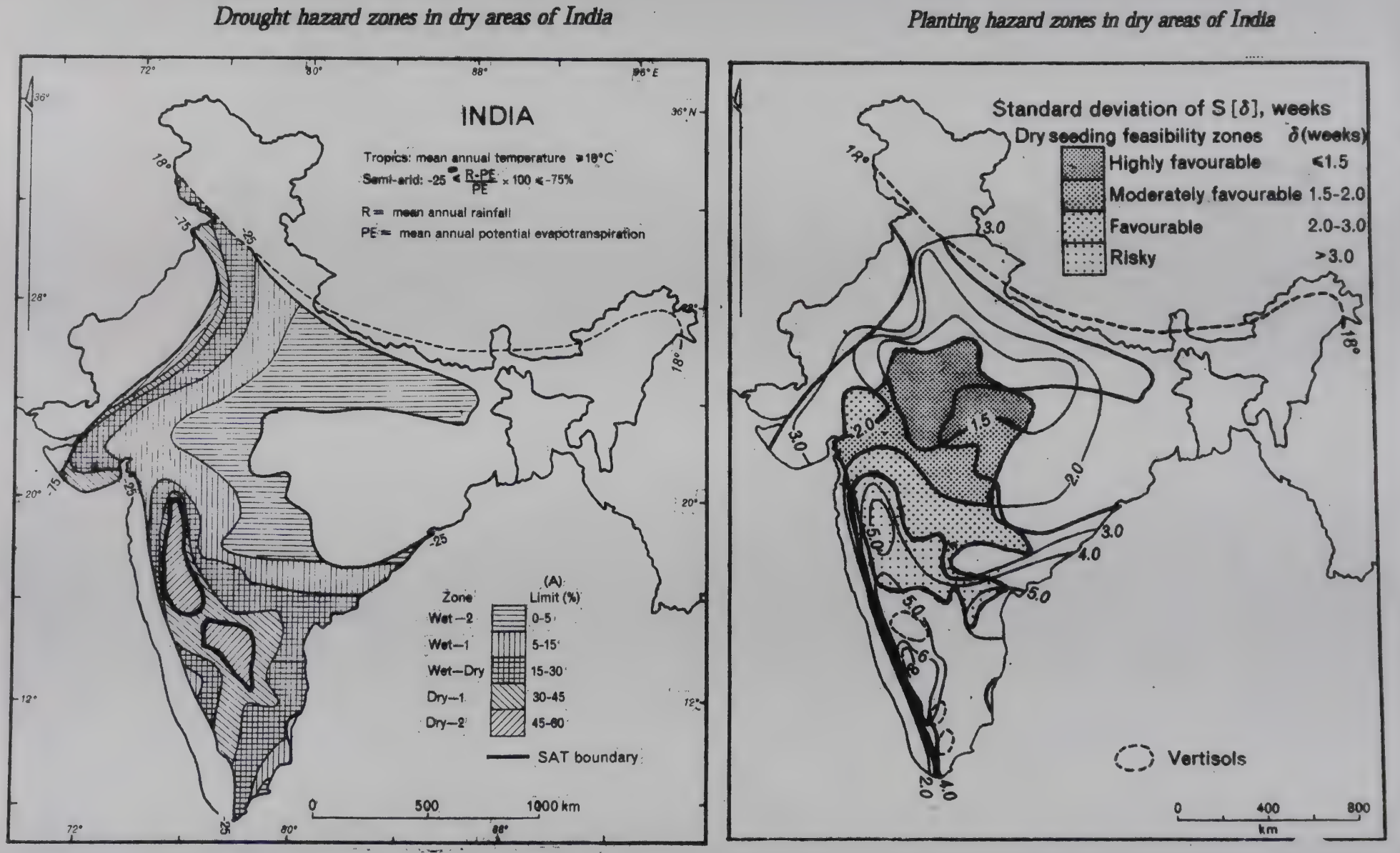

Fig - 9: Agriculture risk in SAT India (a) planting risk zones and (b) drought risk zones

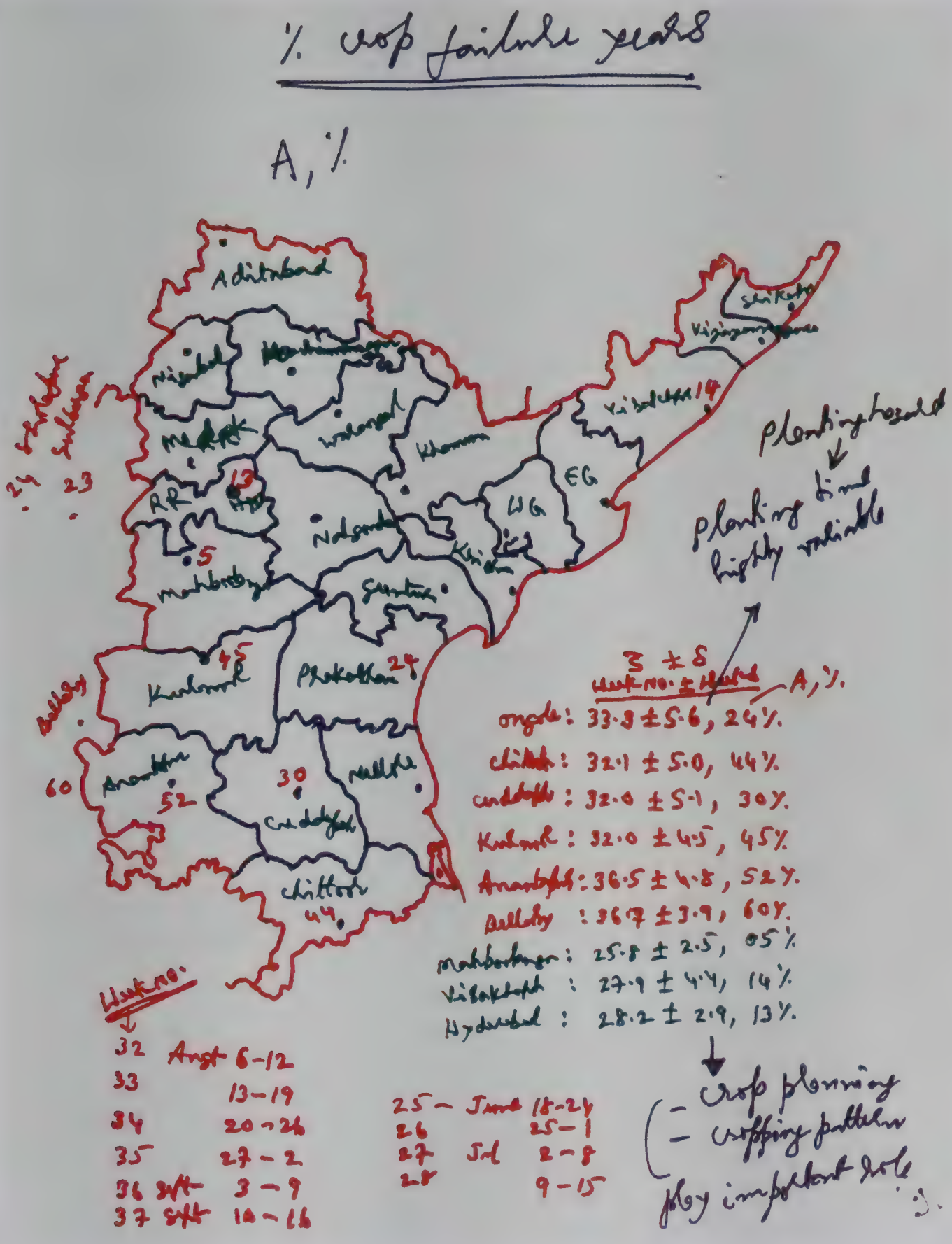

Fig - 10: Drought risk at few selected locations in AP

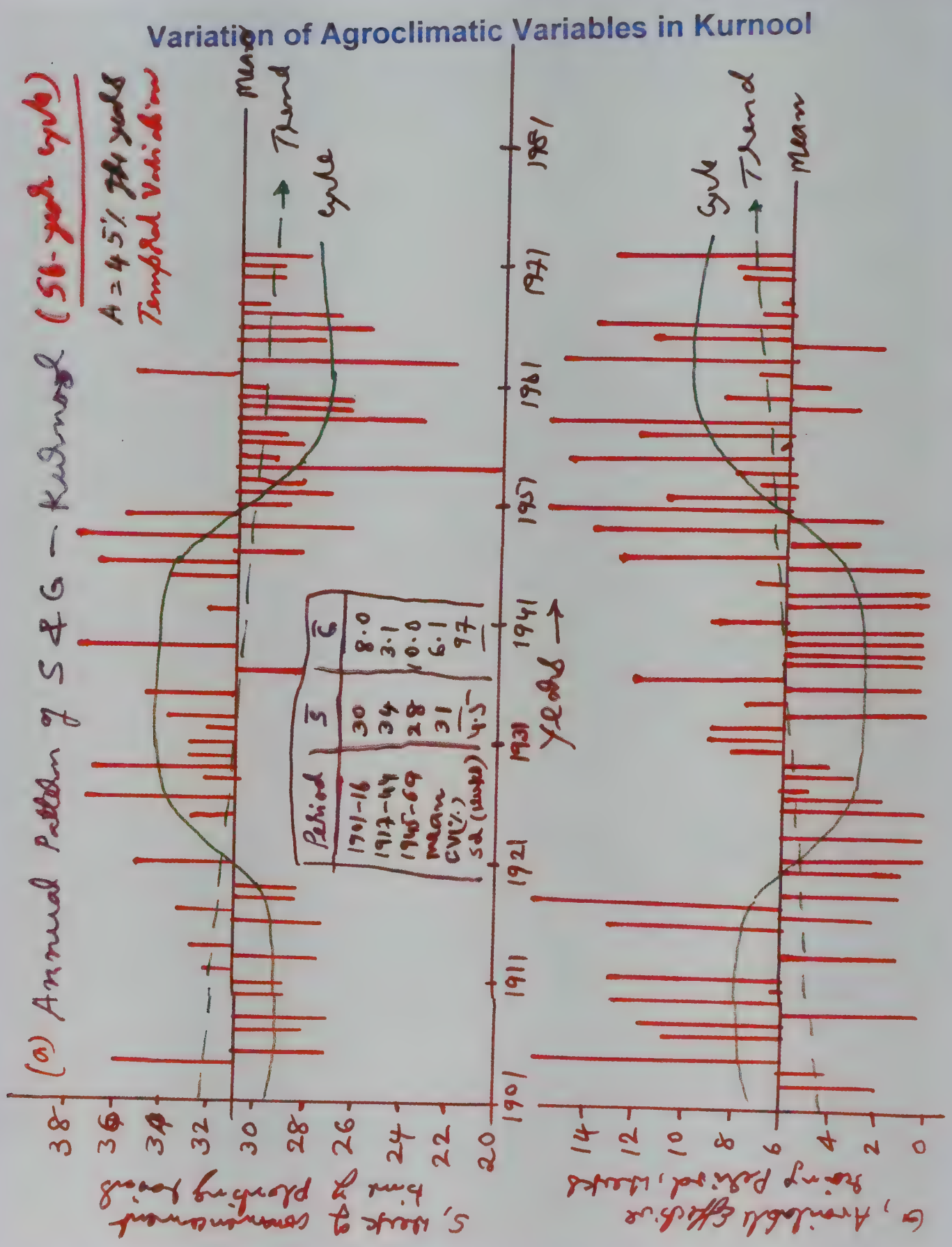

Fig - 11: Agricultural risk patterns at few selected stations in AP (a) Kurnool, (b) Hyderabad & (c) Kadapa

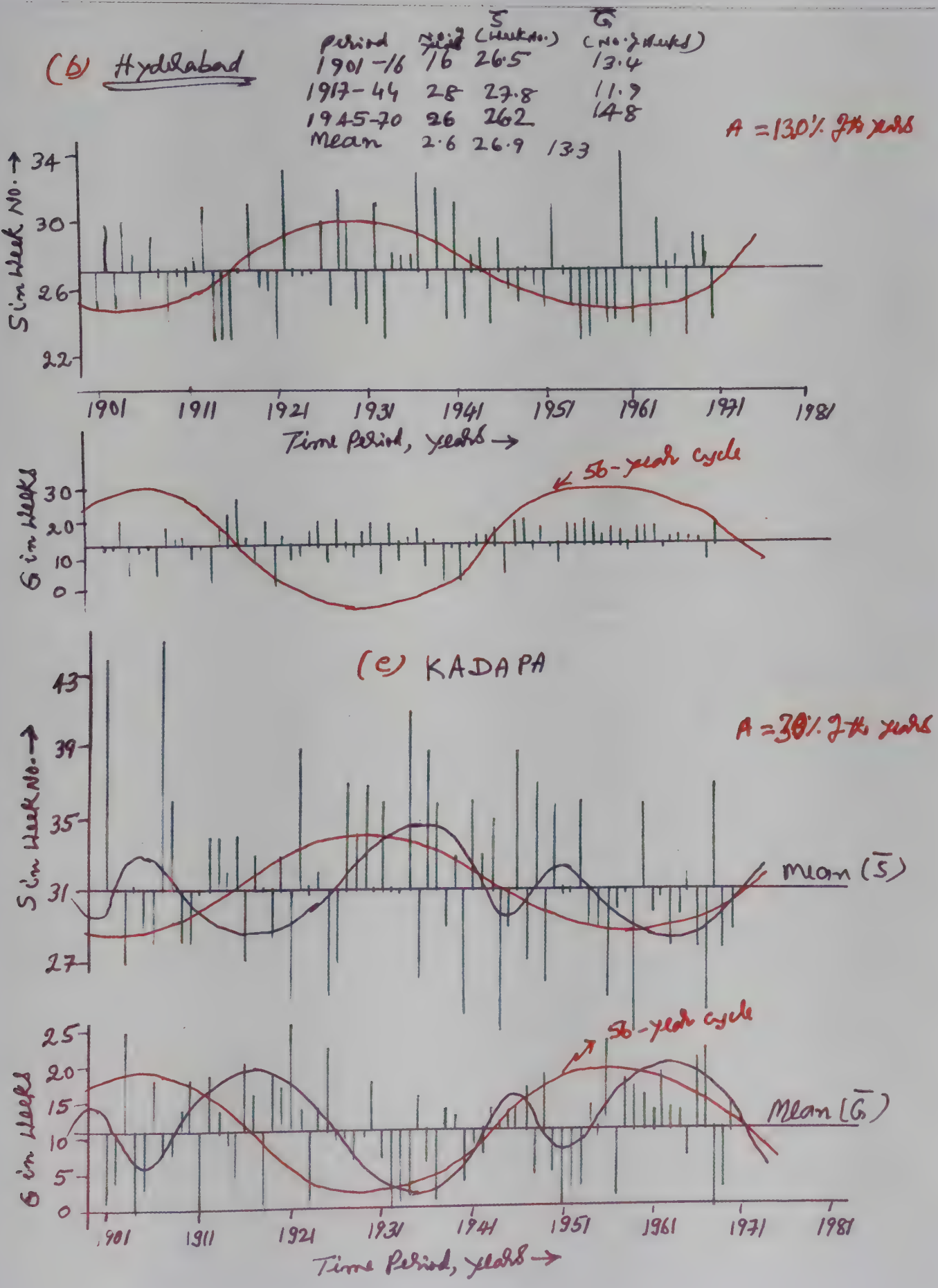
(b) Hyderabad
Period
1901-16
1917-44
1945-70
Mean
S (Week No.)
16
28
26
2·6
26·5
27·8
26·2
26·9
G (No. of Weeks)
13·4
11·9
14·8
13·3
A = 130% 7th years
S in Week No.
34
30
26
22
1901
1911
1921
1931
1941
1951
1961
1971
1981
Time Period, years
G in Weeks
30
20
10
0
56-year cycle
(c) KADAPA
A = 30% 7th years
S in Week No.
43
39
35
31
27
Mean (S̄)
G in Weeks
25
20
15
10
5
0
56-year cycle
Mean (Ḡ)
1901
1911
1921
1931
1941
1951
1961
1971
1981
Time Period, years

Fig - 11: Contd...

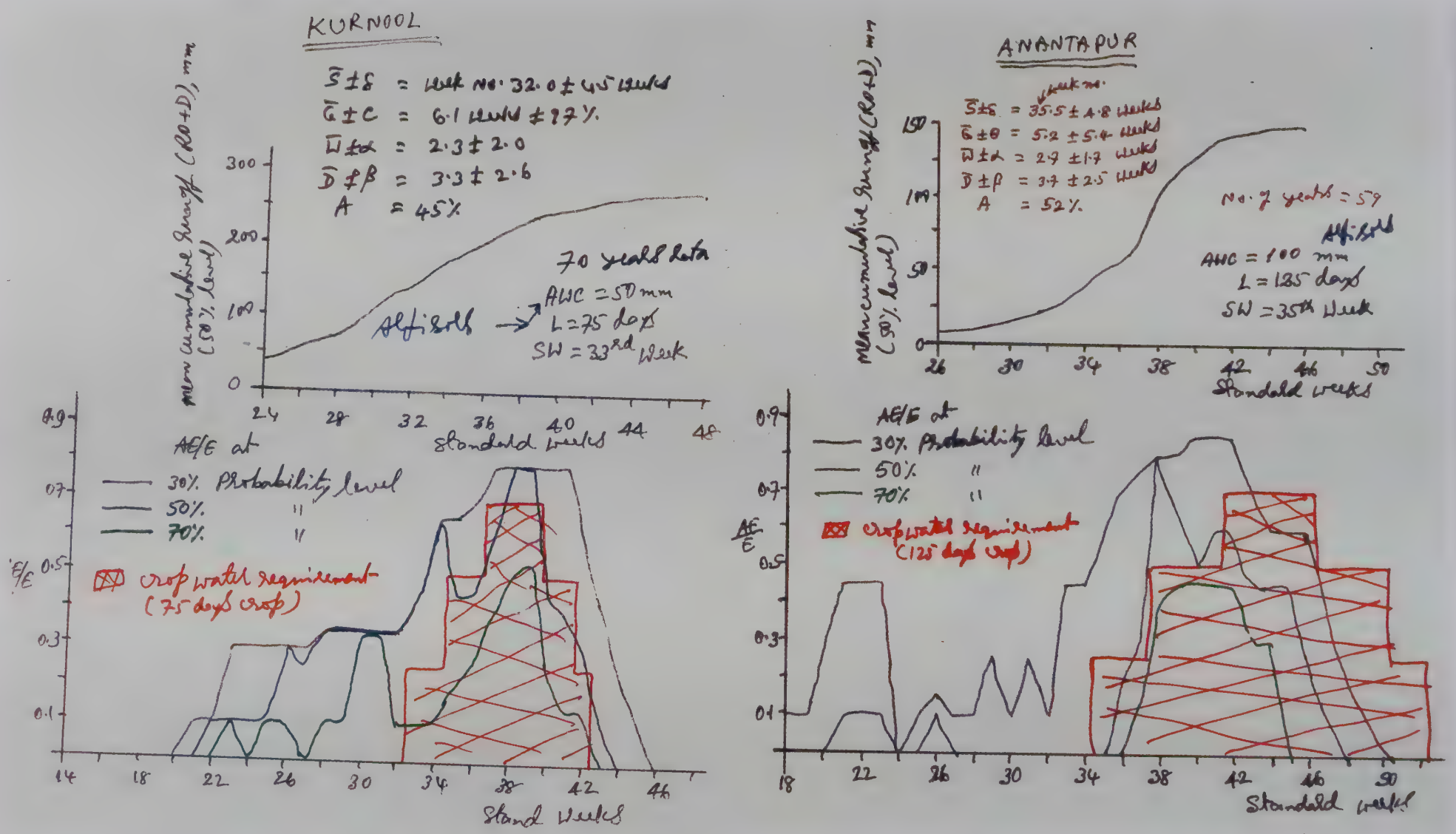
KURNOOL
S±δ = Week No. 32.0 ± 4.5 Weeks
G±C = 6.1 Weeks ± 77%
W±α = 2.3 ± 2.0
D±β = 3.3 ± 2.6
A = 45%
70 years data
AWC = 50 mm
L = 75 days
SW = 33rd Week
Alfisols
mean cumulative runoff (RO+D), mm (50% level)
Standard weeks
AE/E at
30% Probability level
50% "
70% "
crop water requirement (75 days crop)
ANANTAPUR
S±δ = 35.5 ± 4.8 Weeks
G±θ = 5.2 ± 5.4 Weeks
W±λ = 2.9 ± 1.7 Weeks
D±β = 3.7 ± 2.5 Weeks
A = 52%
No. of years = 57
AWC = 100 mm
L = 125 days
SW = 35th Week
crop water requirement (125 days crop)

Fig - 12: Soil water balance results for Kurnool & Anantapur (a) AE/E vs weeks at different probability levels and mean cumulative runoff (b) mean soil moisture under different soils & planting time-crop duration

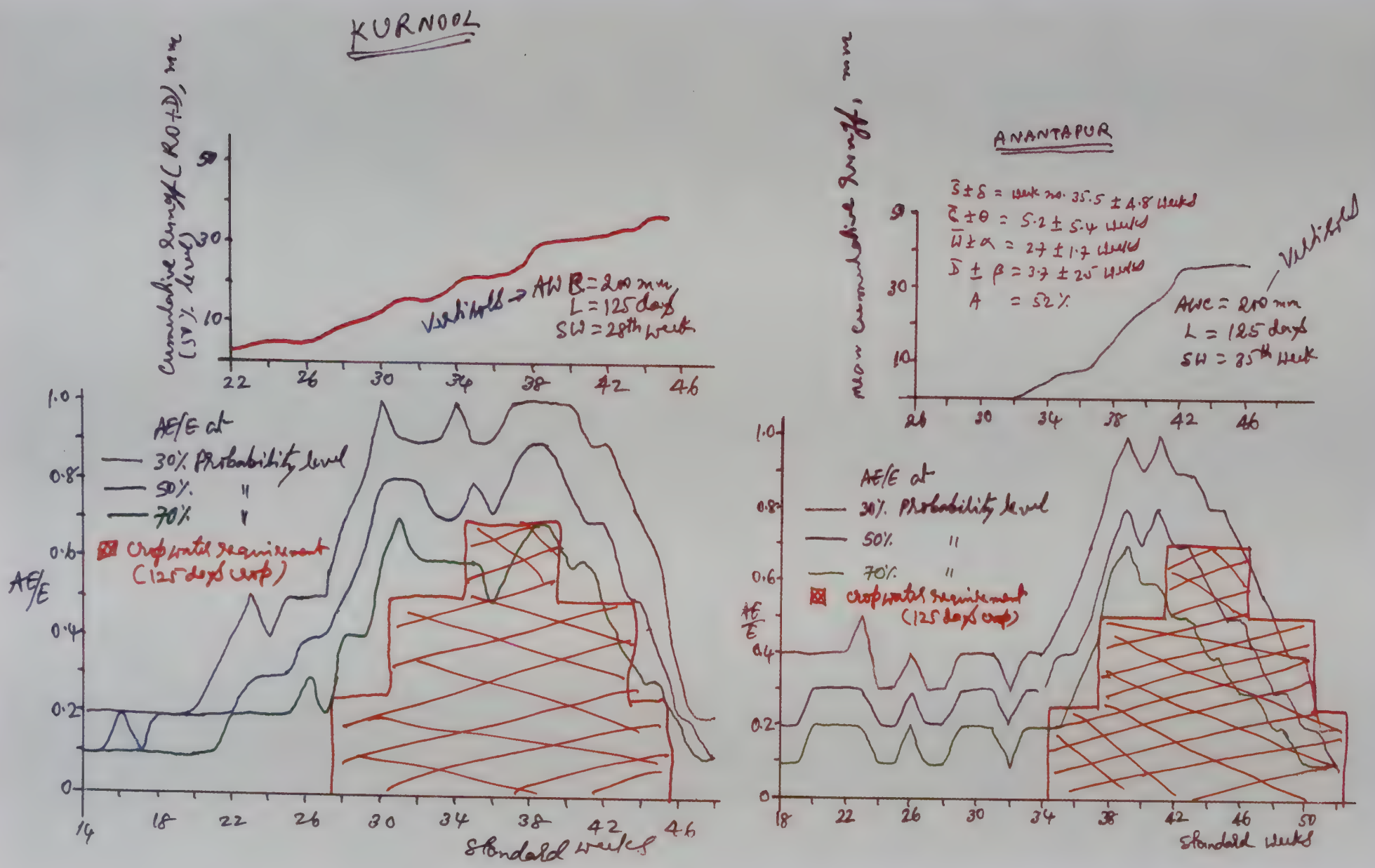
KURNOOL
Cumulative Rainfall (RO+D), mm
(37% level)
Vertisols → AWR = 200 mm
L = 125 days
SW = 28th week
AE/E at
30% Probability level
50% "
70% "
Crop water requirement
(125 days crop)
AE/E
Standard weeks
ANANTAPUR
Mean cumulative Rainfall, mm
x̄ ± δ = Week no. 35.5 ± 4.8 Weeks
ȳ ± θ = 5.2 ± 5.4 Weeks
w̄ ± α = 27 ± 1.7 Weeks
d̄ ± β = 3.7 ± 2.5 Weeks
A = 52%
Vertisols
AWC = 200 mm
L = 125 days
SW = 35th Week
AE/E at
30% Probability level
50% "
70% "
Crop water requirement
(125 days crop)
AE/E
Standard weeks

Fig - 12: Contd...

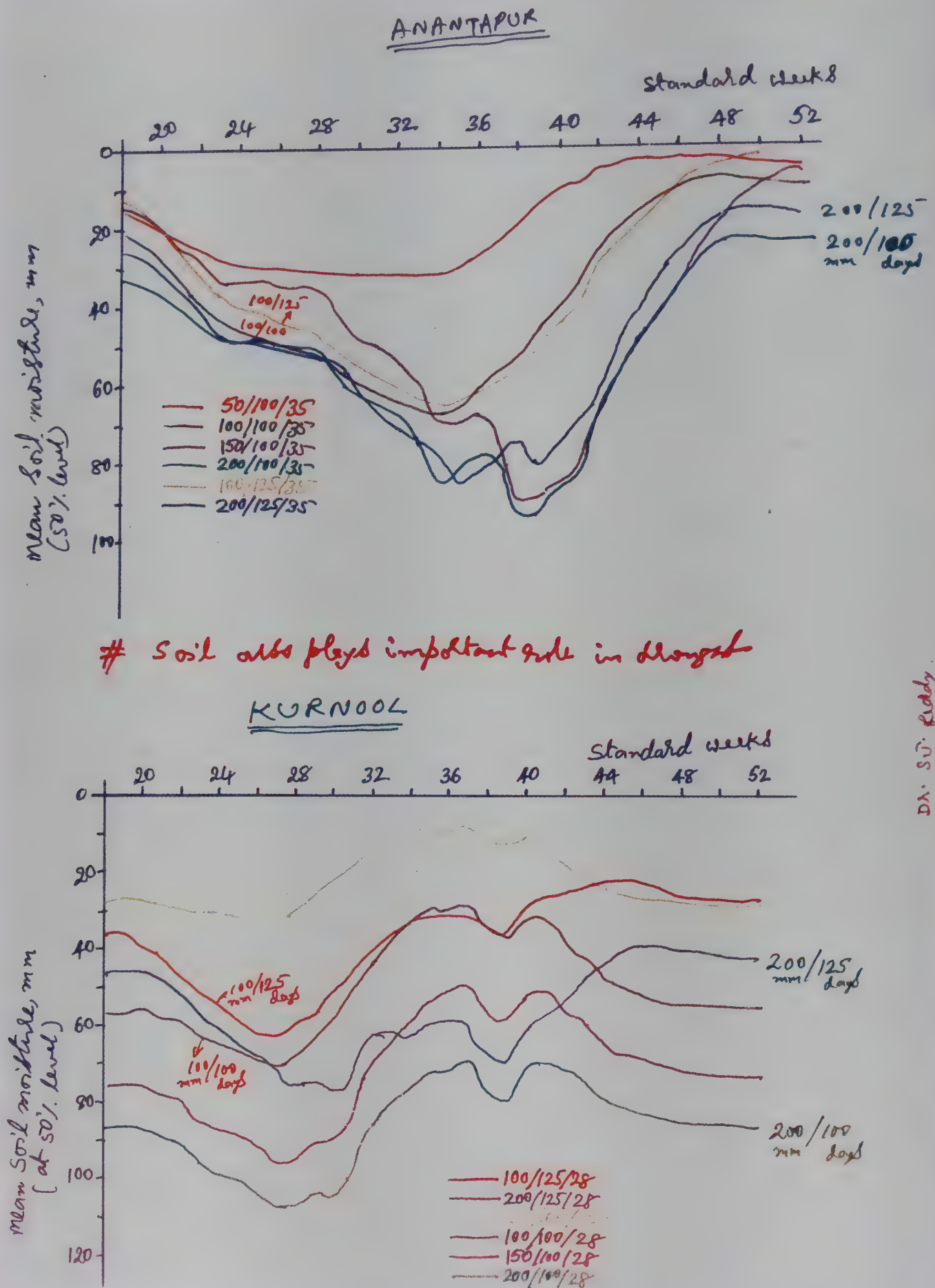
ANANTAPUR
Standard weeks
20 24 28 32 36 40 44 48 52
0 20 40 60 80 100
Mean Soil moisture, mm (50% level)
200/125 mm days
200/100 mm days
100/125
100/100
50/100/35
100/100/35
150/100/35
200/100/35
100/125/35
200/125/35
Soil also plays important role in drought
KURNOOL
Standard weeks
20 24 28 32 36 40 44 48 52
0 20 40 60 80 100 120
Mean Soil moisture, mm (at 50% level)
100/125 mm days
100/100 mm days
200/125 mm days
200/100 mm days
100/125/28
200/125/28
100/100/28
150/100/28
200/100/28
Dr. S.V. Reddy

Fig - 12: Contd...

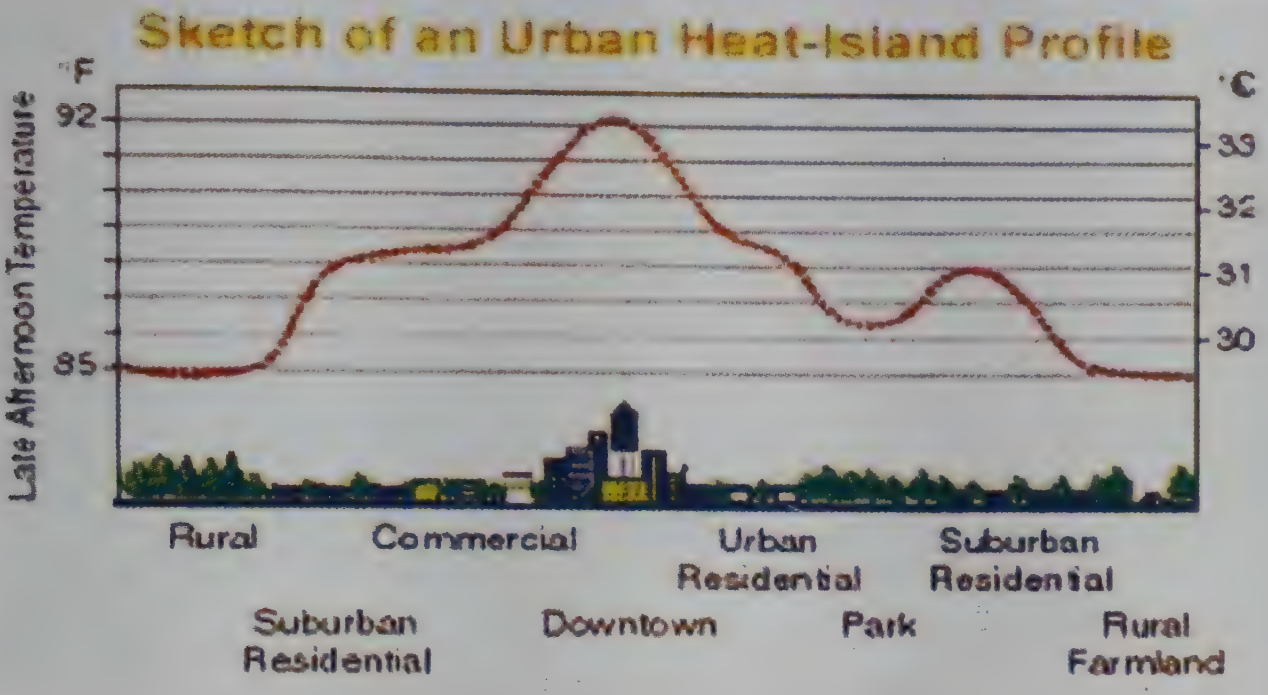

Fig - 13: Temporal profile over urban cross section (an example)

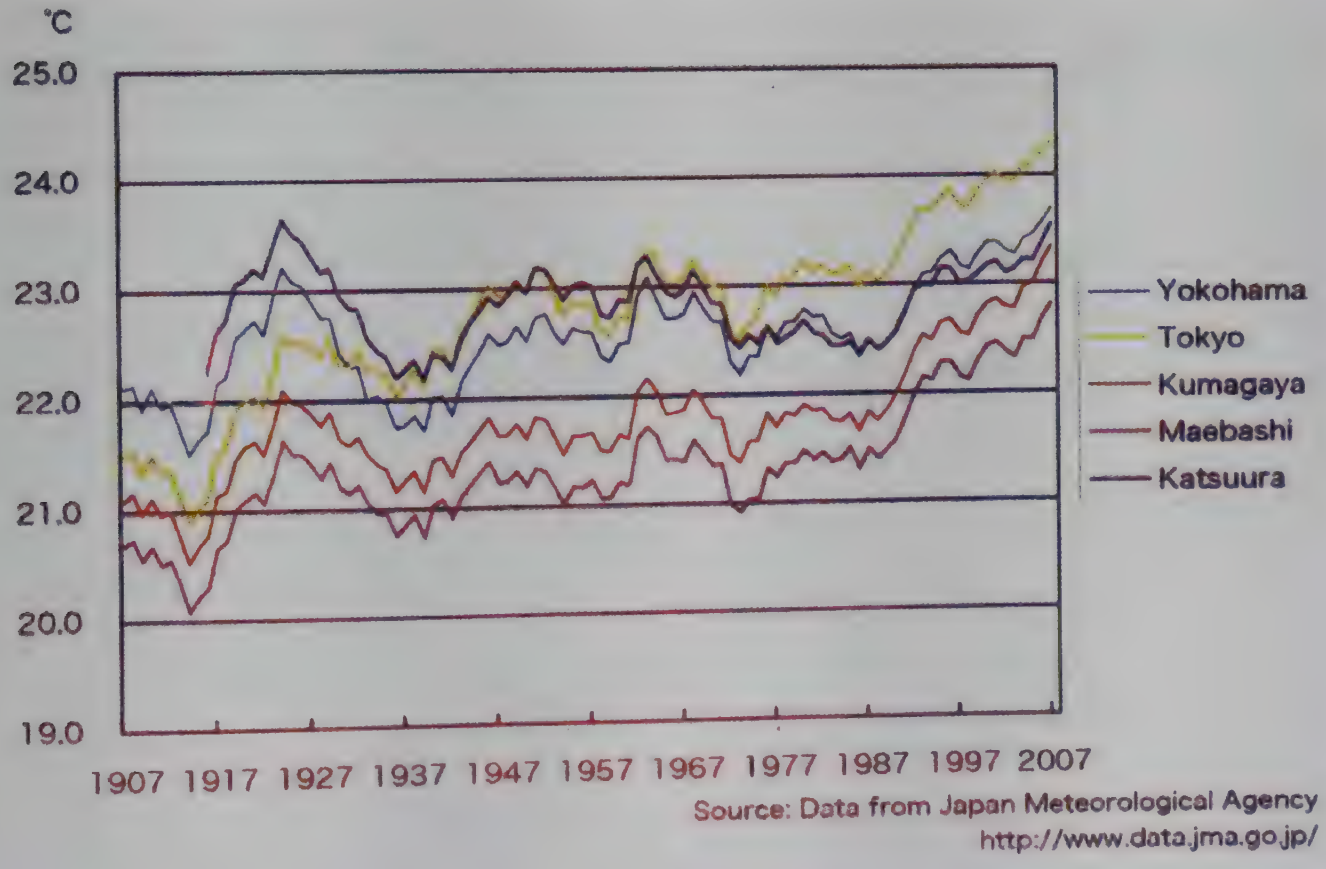

Fig - 14: Tokyo urban temperature growth relative to suburbs

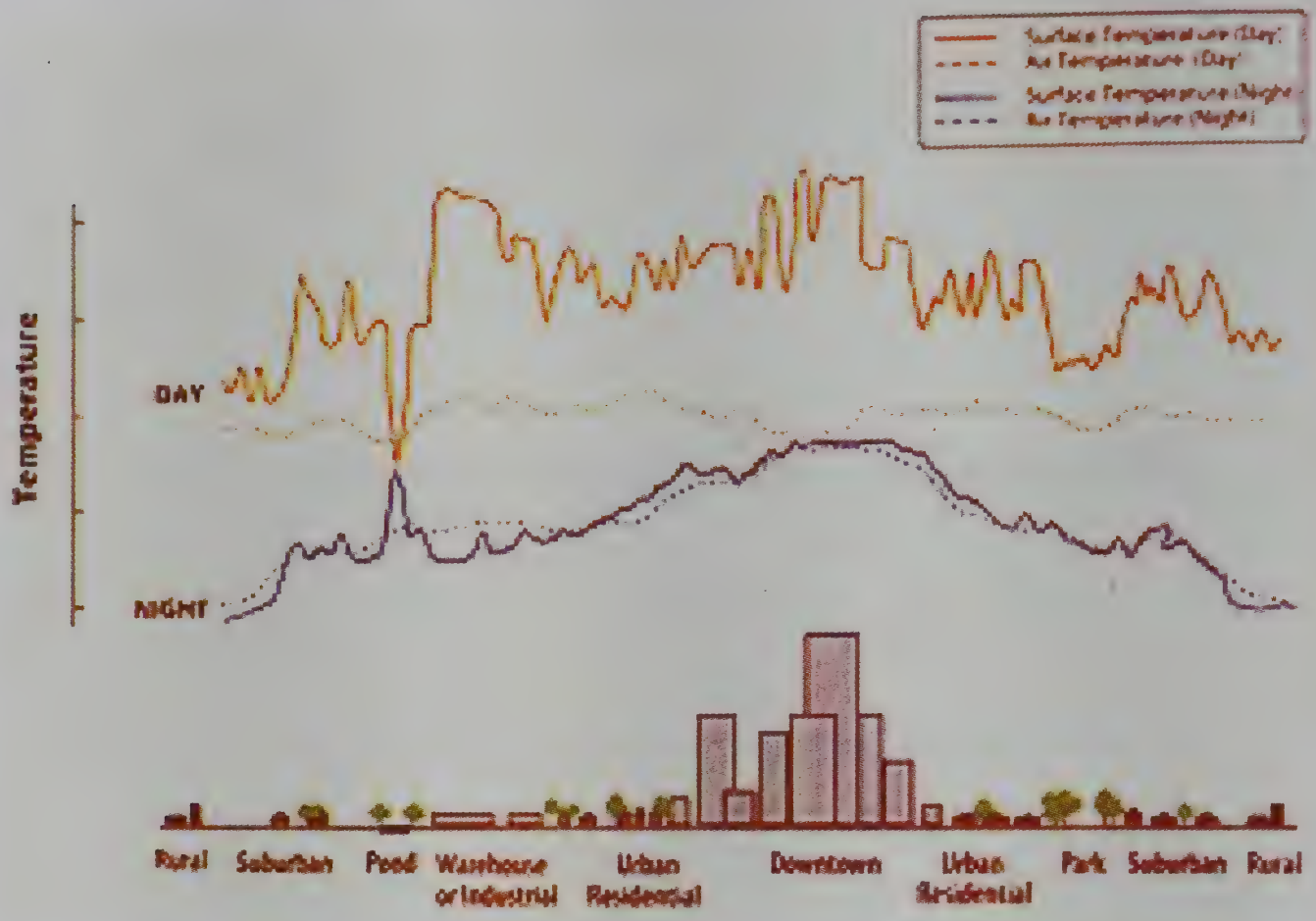

Fig - 15: Day & night temperatures at surface to atmosphere

Table 1: Changes in air pollution in twin cities

Parameter	Air Pollution ($\mu g/m^3$) Year 1998	2006	The lowest (year)
SO_2	18.6	5.0	1.9 (2003)
NO_x	38.3	25.5	20.1 (2003)
RSPM	109	99	73 (2004)
TSPM	287	261	216 (2004)
Vehicles	9 lakhs	17 lakhs	

Appendix – I: Comments/Observations relating to an article on input subsidies issues

[Comments on "Fertilizer Subsidy in India: Who are the Beneficiaries?" by Vijay Paul Sharma & Hrima Thaker of IIM, Ahemdabad (W. P. No. 2009-07-01)]

Dr. S. Jeevananda Reddy

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I saw summary report on the said subject in Martha daily newspaper on 11th November 2009. After reading the summary, I looked into the full article by the authors in internet and I thought I should write on this issue. The following are some of my observations.

General Observations

I am one of the few advocating giving input subsidies to farmers directly instead of giving it to the industry based on my experience with the agriculture systems functioning in India and more particularly in Andhra Pradesh. This was part of my submissions to Hon'ble Prime Minister as well Planning Commission on few occasions.

Point 1: Theoretical vs practical

There is vast difference between theoretical and practical exercises. Unfortunately, IIM being a prestigious institution also relied heavily on theoretical exercise like all others in drawing their inconsistent conclusions. The authors relied heavily on the statistics published by government departments and some deduced from the air. Every body knows how reliable are our statistical data sets compiled by government agencies!!! As professors

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from the prestigious institute instead relying entirely upon such data sets, should have substantiated with some field studies carried out independently at least in one state. Then this report should have carried some credibility. Let me give an example from my own experience.

As an expert of Food & Agricultural Organization (FAO/UN) in Mozambique, I presented food aid requirement for different provinces in Mozambique based on my model before a committee headed by Prime Minister, which was attended by Ambassadors of all developed countries, Resident Representatives of UNDP & FAO. They were happy with my report but suggested that I should go around the country and verify the results with ground realities, for which they put a twin engine jet aircraft at my disposal, as there was no way to go by road – roads were mined —. I made the trip and released the final report, which was released to press by the President of the country without any additions or deletions.

Comments on issues raised in the working paper

In the working paper, as I understand, there are five issues, namely:

- Who are the beneficiaries?
- Has it been distributed uniformly?
- How much of what is paid out actually finds its way into the pocket of the farmer, and how much is siphoned away by the input companies — The paper shows that general perception that about one-third of fertilizer subsidy goes to fertilizer industry is misleading –
- The proposed policy of direct transfer of fertilizer subsidy to farmers is misconceived and inappropriate and its adverse effects outweigh the perceived benefits of it
- Adverse impacts on Production vs income

Point 2: Issues vs lapses

The authors state that "Agricultural subsidies that encourage production and productivity have been widely criticized because of the cost of subsidies and they are perceived to be far from uniformly distributed". This is a flawed statement. The criticism was not against agricultural subsidies per-se but on the contrary asking the government to increase such subsidies by fighting at WTO meetings to go on par with developed nations. Yes, the criticism is on not distributed uniformly. This is clearly evident from the data presented by the authors itself.

There is no dispute as far as on fertilizer subsidy; but the question is whether the fertilizer subsidy given to fertilizer industry directly or direct transfer of fertilizer subsidy to farmers instead to fertilizer companies provide equitable distribution is the basic question that emerges from the few of the above issues. The authors haven't made any attempt to justify the statement questioning the rationale for direct transfer of subsidy to farmers!!! From their presentation, it is clear that there is a clear cut disparity in fertilizer subsidy distribution among regions, among crops and among farmers (dry land to wet land; small to large farm holdings):

- The study shows that fertilizer subsidy is more concentrated in few states, namely, Uttar Pradesh (17.5% of share of subsidy on fertilizer during 2007-08), Andhra Pradesh (11.3%), Maharashtra (10.2%), Madhya Pradesh (7.8%), Punjab (7.7%) and Gujarat (7.0%). The authors state that "Inter-state disparity in fertilizer subsidy distribution is still high though it has declined over the years";
- The study also shows that "Rice is the most heavily subsidized crop (32.2%) followed by wheat (20.3%), sugarcane (6.3%), cotton (5.9%) and groundnut (3.0%). These crops account for more than two-third of total fertilizer subsidy" – by this, the authors also agreed that there is inter-crop disparity in fertilizer subsidy;
- The study highlights the existence of fair degree of equity in distribution of fertilizer subsidy among farm sizes based on pure statistics. The small and marginal farmers have a larger share in fertilizer subsidy in comparison to their share in cultivated area.

1. From figure 1 of the report, it is clear that there was a large gap between production and consumption during 2003-04 to 2007-08. From Figure 2 of the report presents a steep rise in fertilizer subsidy component after 2007-08 while the fertilizer subsidy as percent of total subsidies (Figure 3) fall steeply during 2000 to 2003 as imports were bottom low (though prices were low) and there onwards started steep increase. It looks that with the increased imports and reduced local production has given rise to in excess production over consumption (Figure 6). These disparities go with political parties ruling the nation at that time. During NDA time encouraged indigenous production and during Congress regime gave equal importance to indigenous production & imports. These actions are primarily related to politics of gambling to serve the vested interests.

2. In 2001-02 (Table 5), around 82.2% farm holdings have less than 5 acres and 6.8% farm holdings have more than 10 acres. The former group

constituted 42.6% and 34.6% share in gross cropped area, respectively. However, the % share in total fertilizer consumption presents to high in the former case (52.0%) compared to the later group (25.9%). This was arrived basically because of faulty fertilizer consumption per ha figures (Table 6). In fact, here it was not separated irrigated area and un-irrigated area consumption pattern, though in Figure 8 it was presented average kg/ha under irrigation (145.7 ha) and un-irrigated (50.9 kg/ha). These figures need substantiation with ground realities. For example:

- Nearly 25 to 30% of fertilizers supposed to be distributed to farmers changes hands illegally through official-political-industry channels – however, with this rich farmers are not affected but all this go under small and marginal farmers binami lists;
- The area cultivated in a given year based on planned and actual change the figures of fertilizer under different groups – manipulation;
- Farmers, more particularly dry land farmers collect the subsidized inputs (fertilizers, seeds, etc) sell to other needy farmers in the neigbourhood or outside the state for profit. This is more in dry years. This is not accounted, which goes under small and marginal farmers list;
- This year in Andhra Pradesh, with Kari rains failing as well large part did not get canal water and yet they collected fertilizers – majority of them are not even started cultivation and yet claiming crop failure and thus subsidized inputs to Rabi crop, etc. These are the some of the issues that must go into while accounting the real fertilizer use under irrigation and non-irrigation agriculture on the one hand and small and rich farmers on the other hand.
- Government statistics do not account all these aberrations as the state government officials give manipulated figures to balance in and out of fertilizers;
- Whether the subsidy siphoned to industry or not, in addition, primarily relates to answering two basic questions, namely (i) on what basis the quantum of subsidy to industry is arrived? and (ii) how the fertilizer prices are fixed by the industry? This in fact relates to bureaucratic-politico-industry nexus in sharing the subsidy component!!! – We have seen in Figure 6 —. The authors have not accounted this component too. Like this, there are several such issues. If one goes into field, then only they know such loop holes in the government statistical data on which we derive conclusions that affect our economy and environment.

Point 3: Irrigated vs un-irrigated

With the green revolution technology, a large gap has been created between dry land and wet land agriculture on the one hand and dry land and wet land crops on the other hand. For example:

Irrigated agriculture:

- Irrigation facilities are provided at huge cost;
- Credits through government agencies are easily available;
- Subsidized inputs are provided;
- The produce is procured by FCI/government;
- Highly subsidized rice & wheat are included in PDS system that changed the food habits of the population and thereby introduced new health hazards;
- Through illegal export of rice minting thousands of crores by vested groups;
- All these encouraged growing rice after rice under highly subsidized fertilizer inputs;
- Fertilizer inputs introduced air, water, soils & food pollution.

Un-irrigated agriculture:

- Crops are grown at the mercy of "Rain God" that vary with season to season, year to year, location to location, etc;
- Credits from government agencies is very difficult & thus mostly procured through private money lenders at exorbitant interests that result farmers suicides;
- Majority of them use organic inputs like farmyard manure which does not carry any subsidy and yet farmers suicides are rarely seen;
- The produce are not procured by FCI/government;
- The produce are not included in PDS system leave alone subsidized sale under PDS system, though it is a healthy food;
- That mean, highly subsidized crops are getting all encouragements but no such encouragement was given to less subsidized crops grown primarily under un-irrigated condition;

Point 4: Fertilizer vs trader

In India as well in Andhra Pradesh even after six decades of Independence around 60% of the cropped area is still at the mercy of "Rain God" and only around 40% of the cultivated area receives irrigation. In Andhra Pradesh, only 50% of the irrigated area depends upon canal irrigation from dams and the rest depends upon lift irrigation (wells & bore wells) and tanks which again

primarily depends upon rainfall in any given year. In Andhra Pradesh, the drought risk varies between 0 to 60% of the years in different zones. The risk is further amplified by chemical inputs use and planting hazard in dry land agriculture. With this, the farmers rarely use chemical inputs but use traditional inputs and unfortunately such farmers never get government subsidies. By providing input subsidies to farmers directly, help overcoming the major ills faced by farmers and there by easily replace chemical inputs by organic inputs that provide healthy food. This also eradicates the share in fertilizer subsidy hither to be enjoyed by politico-bureaucrat-industry nexus.

During 2008-09 crop years, Andhra Pradesh produced bumper production, the highest so far, more particularly paddy/rice. With this neither farmer nor the government or the consumer benefited but the trader benefited through illegal export of rice to outside India and outside Andhra Pradesh – all this money entered into market as black money and helped price rises in all sectors. As a result the prices of the rice in the open market doubled and thus break the back of the poor on one hand and government was compelled to raise the perks to government employees and thus emptied the treasury. Even if the net profit is Rs. 10 per kg through the illegal exports the traders (after sharing the bribes to politicians & bureaucrats, etc) have gained more than fertilizer subsidy given to Andhra Pradesh. The farmers collected only the price fixed by the government (Minimum Support Price). The media reports indicate that around 35 to 45 lakh tons of rice was illegally exported in an election year.

Point 5: Production vs income

Finally the authors state "A reduction in fertilizer subsidy is, therefore, likely to have adverse impact on farm production and income of small and marginal farmers and un-irrigated areas (about 60%) as they do not benefit from higher output prices but do benefit from lower input prices".

- How the authors have arrived at this conclusion was not explained; the basic question is not reduction in fertilizer subsidy but the question is transfer of subsidy component to farmers directly or not!!!
- In fact, under the green revolution technology with cost of inputs growing day by day – that is why the concept of minimum support price was introduced. Otherwise the trader is ready to exploit the farmers by lending money, etc — the small and marginal farmers and un-irrigated areas benefit from higher output prices when compared with lower input prices as majority of them cultivate under traditional inputs;
- Here, another important point is, farm production and income have different impacts on farmer. Higher farm production is beneficial to trader but higher income is beneficial to farmer. When the production goes up, the traders bring down prices;

- After the Bt-cotton introduction, area under cultivation of cotton increased as well input costs increased abnormally – this has introduced adulterated seed & inputs, which affected the production as well on economy —. As a result under vagaries of monsoon, in majority of the years the losses are too high and as a result farmers' suicides have increased. Under un-irrigated condition, with drought condition in any critical crop stage under chemical inputs impact the yield negatively severely. Cotton Corporation of India (CCI) buys the cotton as per the price fixed by the government the farmer benefited otherwise the traders benefited.

Summary & Conclusions

- The study lacks practicality & thus conclusions are biased opinion;
- There is nothing against input subsidies to agriculture but this is not reaching the targeted groups uniformly in terms of regions, crops and farming – dry land & wet land and small & large farm holdings;
- Unfortunately, in every aspect dry land agriculture sector is receiving step- motherly treatment by governments and to overcome such disparity the input subsidies must go to farmers directly – through cooperative farming the distribution could be easily achieved. This way the government can encourage organic inputs use and thereby consumer gets healthy foods;
- The present fertilizer subsidy is more beneficial to industry-politico-bureaucratic-traders nexus rather than to farmers;
- The question is not reducing the fertilizer subsidy but the question is the transfer;
- Higher production benefits the trader rather than farmer and higher prices benefit the farmers.

Note: Few days later Hon'ble Central Minister visited to attend a conference and announced that the government is looking at providing input subsidy directly to farmers instead to industry.

Dr. S. Jeevananda Reddy

Re: Fw: Comments on "Fertilizer subsidy in India: Who are the beneficiaries?"
From: Jeevananda Reddy <jeevanandareddy@yahoo.com>Add to Contacts

To: Prof. Vijay Paul Sharma <vijays@iimahd.ernet.in>
Cc: Business Bureau Head <info@vaartha.com>

Namaskar,

It is quite shocking to see a casual reply lacking scientific temper.

Though the authors made statements/conclusions like a man on the street from the air and not based on the statistical data presented in the working paper. Take for example, "they do not benefit from higher output prices but do benefit from lower input prices" is not based on the data but deduced from the air just to favour the industry. The authors presumed something and made statement that is from personnel perceptions & ideas. Such statements do not stand for scientific scrutiny.

Neither ICRISAT nor FAO or even for that matter ICAR, a government scientific organization, make policy decisions on the statistical data published by governments; but they are purely based on the data collected from field studies.

By presenting such "trash" studies under the disguise of policy paper, the authors are mis-leading the public in general and governments in specific. Such studies only benefit the multinational companies.

Thanks
Dr. S. Jeevananda Reddy

From: Prof. Vijay Paul Sharma <vijays@iimahd.ernet.in>
To: Jeevananda Reddy <jeevanandareddy@yahoo.com>; Business Bureau Head <info@vaartha.com>
Sent: Mon, November 16, 2009 4:00:37 PM
Subject: Re: Fw: Comments on "Fertilizer subsidy in India: Who are the beneficiaries?"

Dear Dr. Reddy,
Greetings from IIMA!
First, I would like to sincerely thank you for reading the paper and your comments. All observations made in the paper are based on statistics/data published by govt agencies, industry association, etc. If your basic premise is that all govt. data is unreliable, then there is no point in responding to the issues raised by. Since you have worked with ICRISAT and FAO, I am sure you would agree that most of policies are formulated based on data and not on our

personal perceptions/ideas.
Once again thanks for your comments
Vijay Paul Sharma

Jeevananda Reddy wrote:
—— Forwarded Message ——
From: Jeevananda Reddy <jeevanandareddy@yahoo.com>
To: vijays@iimahm.ernet.in
Cc: Bussiness Bureau Head <info@vaartha.com>
Sent: Mon, November 16, 2009 9:39:51 AM
Subject: Comments on "Fertilizer subsidy in India: Who are the beneficieries?"
Namaskar,
Please find attachment of my comments on the Working paper on Fertilizer subsidy in India
Thanks
Dr. S. Jeevananda Reddy

సహకార వ్యవసాయం అవసరమే

డా॥ సజ్జల జీవానందరెడ్డి

ఇప్పుడు మన వ్యవసాయ రంగంలో నెలకొన్న వివిధ వరిస్థితుల దృష్ట్యా సహకార వ్యవసాయ విధానమే శరణ్యం. దీనిపై చర్చలోకి పోయే ముందు, ఒక ముఖ్యమైన విషయం చెప్పుకోవడం ఎంతో అవసరం. ఇప్పుడు ప్రభుత్వం ప్రవేశపెట్టాలనుకొన్నది సహకారంలో కార్పొరేటు వ్యవసాయ అంశాలను జొప్పించడం.

హరిత విప్లవం ద్వారా మన వ్యవసాయ రంగాన్ని పట్టి పీడిస్తున్న ముఖ్య రోగాలు రెండు. మొదటిది రైతు సంఘాలు - రైతు నాయకులు - ప్రపంచ ద్రవ్యనిధి సంస్థ బహుళజాతి సంస్థలకు వత్తాసుదారులుగా మారి, రైతులను వారి చెప్పు చేతల కిందఉంచుకొంటూ, వ్యవసాయాన్ని- వ్యవసాయ రంగాన్ని నిర్వీర్యంచేసేదిశలోకి నెట్టడం జరుగుతోంది. ఇలాంటి క్లిష్టవరిస్థితులవల్ల, వ్యవసాయం గిట్టుబాటుగాక రైతుల ఆత్మహత్యల పర్వం దినదినాభివృద్ధి చెందుతున్నది. రెండవది రైతులు కలిసికట్టుగా లేకపోవడం ద్వారా చిన్న కమతాలు ఎక్కువ ఆవడం మూలంగా, ప్రతి పనికీ అందరూ పోవడం ద్వారా సమయం, ఖర్చు పెరగడం, కర్రీలు (విత్తనాలలో, ఎరువులు, పురుగుమందులు) పెరగడం, ఆరికట్టలేకపోవడం, ప్రభుత్వ ప్రోత్సాహకాలు సరైన సమయంలో అందక, ఫలితాలను విత్త చేసుకోవడానికి గిడ్డంగులు లేక వ్యాపారి నిర్ణయించిన ధరలకు అమ్ముకోవడం లేదా చెడిపోవడం, ఉన్న సీటి వనరులను సద్వినియోగపర్చుకోలేకపోవడం, విద్యుత్ వ్యాపారణ కష్టాలను అధిగమించలేకపోవడం, పంట ఖర్చు పెరగడం, వగైరాలు. హరిత విప్లవానికి ముందు రైతులకు ఇలాంటి కష్టాలుండేవికావు. అందుకే ఆత్మహత్యలుండేవికావు. అప్పటి వ్యవసాయ విధానంలో వశుపోషణ ముఖ్యం. సహకార వ్యవసాయ ముఖ్య ఉద్దేశం ఇలాంటి విధానమే. ఇక్కడ అధిక దిగుబడులు సాధించటంకంటే, రైతును నష్టాల ఊబి నుంచి బయటపడేసి, ఆత్మహత్యల పర్వం ఆపడమే. ఇక్కడ నేటి ఆదర్శ రైతులపంటల విధానాన్ని దీనిలో అమలుపర్చుకోవచ్చు. ప్రభుత్వ ప్రోత్సాహకాలను సద్వినియోగపర్చుకోవచ్చు. కేంద్రీయఎరువులు పురుగు మందులు వాడుకోవచ్చు. ఇప్పుడు కొందరు రైతులు ఇలాంటి ప్రోత్సాహకాలను బయటి రాష్ట్రాలలో అమ్మి డబ్బు చేసుకోవడం చూస్తున్నాం. ఆలాగే కరువు సాయాన్ని అనుభవిస్తున్నారు. వీటిని అరికట్టవచ్చు.

ఈ సహకార వ్యవసాయ విధానంపై 'వార్త' దినపత్రికలో నా పుస్తకాలలో దీని ఆవశ్యకతపై రాయడం జరిగింది. ఇవన్నీ కూడా 2000 ముందుగానే రాయడం జరిగింది. మరలా వార్త దినపత్రికలో 2006, ఏప్రిల్ 19న 'ఆత్మహత్యలకు ఒక పరిష్కారం సహకార వ్యవసాయం' అనే శీర్షికన వ్యాసం రాయడం జరిగింది. దీని ఆవశ్యకతను 'మెట్ట వ్యవసాయంలో పరిశోధనా ఆవశ్యకతలు' అనే అంశంపై జరిగిన చర్చాగోష్ఠిలో (11వ్లానింగ్ భాగంగా' చెప్పడం జరిగింది. దీనిలో భాగంగా సేంద్రీయ పద్ధతుల ఆవశ్యకతను కూడాచర్చించడం జరిగింది. దీనికి ప్రభుత్వ ప్రోత్సాహకాల లభ్యతపై జరిగినచర్చలో రసాయనిక ఎరువులకు ఎరువులసంస్థలకు ప్రభుత్వం అందజేసే సబ్సీడిని రైతులకు నేరుగా ఇవ్వడం మూలంగా ఇది సాధ్యమని చెప్పడం జరిగింది. ఈ విషయాలు ప్లానింగ్ కమిషన్‌కు కూడా రాయడం

సహకార వ్యవసాయం
వార్త వ్యాసగోష్ఠి

జరిగింది. దీనిలో భాగంగా వశుపోషణావశ్యకత కూడా చెప్పడం జరిగింది.

2000-01లో విజన్ 2020లో భాగంగా తెలుగుదేశం ప్రభుత్వం వ్యవసాయ ముసాయిదా పత్రం (వైట్ పేపర్) విడుదలచేయడం జరిగింది. దీనిలో కార్పొరేటు వ్యవసాయానికి ప్రాముఖ్యత ఇవ్వడం జరిగింది. దీనిపై నేను వార్త దినపత్రికలో వ్యాసాల రూపంలో చర్చించడం జరిగింది. అప్పుడు డా॥వైఎస్‌ఆర్ ప్రతిపక్ష నాయకుడు. ఆయన కోరిక మేరకు 'బ్లాక్ పేపర్' రాసివ్వడం జరిగింది. ఇది తెలుగుదేశం వైట్ పేపర్‌కు ప్రతిగా రాయడం జరిగింది. దీనిలో ముఖ్య అంశం సహకార వ్యవసాయం. దీనిలో అప్పటి తెలుగుదేశం ప్రతిపాదించిన కార్పొరేటు వ్యవసాయంపై కూడా చర్చించడం జరిగింది.

ఇప్పటికి మన రాష్ట్రంలో '60' శాతందాకా వ్యవసాయం వర్షాధారితమే. చెరువులు, బావులు, బోరుబావులు కూడా వర్షాధారితమే. ఈ వరిస్థితులలో ఉన్న వనరులను సక్రమంగా వాడుకొని ప్రకృతి వైవరీత్యాల నుంచి బయటపడాలి. అంతేకాదు మన రాష్ట్రంలో వ్యవసాయమే '60' శాతందాకా ప్రజలకు ప్రధాన జీవనాధారం. రాష్ట్ర ప్రభుత్వం ప్రకటించిన సహకార వ్యవసాయ విధానపత్రంలో పొందుపరచిన కార్పొరేటు వ్యవసాయ విధానం రెండుఅంశాలను చేర్చడం జరిగింది. మొదటిది వ్యవసాయాన్ని యాంత్రీకరించడం. వ్యవసాయాన్ని యాంత్రీకరించడం వారి జీవనోపాధిని దెబ్బతీయడమే. యంత్రాల నైపుణ్యాన్ని ఇలాంటి వరిస్థితులలో మనం [illegible] శాతం మాత్రమే ఉపయోగించుకోగలం అంటే నష్టదాయక విధానం, ఇలాంటివిధానం కుప్పంలో ఫెయిలవడం మనం తెలిసిందే. భారీగా యంత్రాలు, రసాయినిక ఎరువులు/పు[illegible] మందుల వాడకం అంతిమంగా ఆయా కంపెనీలకు, ప్రచ[illegible] కల్పించే రాజకీయ నాయకులకు, వగైరాలకు మాత్రమే [illegible] సాటిగా మిగులుతుంది. ప్రభుత్వం ప్రకటించిన విధాన[illegible] రెండవది రైతు భూములను సంఘాలకు మార్చడం. [illegible] గమనించాల్సిన విషయం భూసంస్కరణలను తప్ప[illegible] పట్టించి, బీనామీ పేర్లతో ఉన్న భూములను ఎలాంటి కష్ట[illegible] లేకుండా దొడ్డిదారిలో క్రమబద్ధీకరించుకోవడానికి ఇం[illegible] మార్గాలు పుష్కలం. ఇవి రెండూ తెలుగుదేశం ప్రవేశ[illegible] కార్పొరేటు వ్యవసాయ విధానంలో భాగం మాత్రమే. [illegible] ప్రభుత్వ టెక్నాలజీ మిషన్‌లోని అధికారులు ప్రపంచ ద్రవ్య[illegible] సంస్థకు వత్తాసు పలికేవారవడం మూలంగా, తెలుగు[illegible] ప్రతిపాదించిన కార్పొరేటు వ్యవసాయ విధానంలోని [illegible] అంశాలను సహకారవ్యవసాయ విధానంలో చేర్చి, దీనిని [illegible] గార్చేందుకు కుట్ర జరిగిందని చెప్పాలి. ఇది మన దుర[illegible] కరం. అప్పుడే కొందరు చైనాను దర్శించి యాంత్రీకర[illegible] అవసరమైన పరికరాల దిగుమతులకు పాపులు కదుపుతున్నా[illegible] కాబట్టి, చిన్న సన్నకారు రైతులవల్ల, సహకార సేద్యం వల్ల ప్రభుత్వానికి చిత్తశుద్ధిఉంటే, ఆచరణలో అది రైతులకు [illegible] యోగపడేదిలా రూపొందించే పద్ధతులు చేపట్టాలి. ఉదాహరణకు రైతు సహకార సంఘాలను చట్టబద్ధంగా చేసి దానిలో సత్యుల భూములు సంఘాలకుగాక రైతులకే చెందే విధంగా ఉండాలి. అంటే రైతులు కలిసికట్టుగా తమ భూములను సహకార వ్యవసాయం కిందకు అనుమతించాలి. అంటే సంఘం నిర్ణయించిన విధానాలప్రకారం వ్యవసాయం,పనులు, లాభాలు సంఘం మొదట నిర్ణయించుకున్న విధానం ప్రకారం సదుచుకోవాలి.

పంటల బీమా విధానాన్ని సంఘం భూములకు సమిష్టిగా వర్తిస్తుంది. ప్రభుత్వం ఇచ్చే ప్రోత్సాహాలు ఆమలు సంఘం అవసరాలను నిర్ణయించి ఖర్చు చేస్తుంది. వండిన గింజలను నిలుప చేసుకోవడానికి వివిధరకాల గిడ్డంగులు నిర్మించుకోవాలి, వశుసంపద పెంచుకోవాలి, సూక్ష్మసేద్యం విధ్వంసం పాటించాలి. కేంద్రీయ వ్యవసాయానికి సబ్సీడి రైతులకు ఇవ్వడం, పంటల ధరలను నిర్ణయించుకోవాలి. ❑

Appendix – II: Climate Change Perspective of Twin Cities Environment

[Paper presented at a seminar (Invited Talk) at 42nd Engineers' Day Celebrations (In commemoration of 149th Birth Day Celebrations of Bharat Ratna Sir Mokshagundam Visvesvaraya) on 15th September, 2009 at Institute of Engineers (India) Andhra Pradesh Chapter. Theme: "Engineering solutions to combat climate change". Proceedings — pp. 1-7.]

Climate Change Perspective of Twin Cities Environment

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Abstract

Climate change is a vast subject in which urban heat-island effect is one component. Unabated growth of urban centres is creating heat-island effect. This was observed as back as 1807 in London. Both the surface and above the surface air temperatures are rising with increasing congestion and air pollution levels in urban centres. Heat-island effect is creating direct and indirect impacts on the climate, energy demand as well emissions of greenhouse gases & human health and welfare. Civil engineers play vital role in the mitigation process starting from planning to selection of building materials. Some of these issues are discussed in brief and as well looked in to these aspects with reference to twin cities.

What is Climate Change?

Climate change has got two components, one is in built in nature, which is beyond human control and the other one is created by man's actions on nature, which are controllable by man (see, Reddy, 2008). The former relates to systematic variations in weather phenomena that repeat itself over periods like Indian Astrological cycle, which are long- and short-term in nature. We call long-term variations as ice-ages seen in temperature and short-term fluctuations, principally seen in precipitation. The fluctuations in precipitation play vital role on agriculture and water resources that need development of adaptive measures to overcome the risks associated with such fluctuations. The other one is related to anthropogenic gases emissions (global warming & ozone depletion) and ecological changes that are associated with changes in the land use and land cover. These play important role at all spatial scales. Urban environment is one such an example expressed in climate change perspective as heat-island effect.

Heat-island

What is Heat-island?: As urban areas develop, changes occur in their landscape. Buildings, roads, and other infrastructure replace open land, water bodies and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings (**Fig. 13**), forming an "island" of higher temperatures in the landscape. Heat-island affect is nothing but increase in temperature due to changes in land use and land cover in urban areas. Luke Howard, an amateur meteorologist in England, first recorded the heat-island effect in 1807 in London. Today, in the largest cities, average temperature can range 5 to 10 °F hotter than surrounding areas (**Fig. 14**). The heat-island effect is not only felt at surface of the Earth but also in the air above the ground. Atmospheric urban heat islands are often weak during the late morning and throughout the day and become more pronounced after sunset due to the slow release of heat from urban infrastructure. Surface urban heat islands are typically present day and night, but tend to be strongest during the day when the Sun is shining. The temperature difference usually is larger at night than during the day (**Fig. 15**), larger in winter than in summer, most apparent when winds are weak.

Conditions Conducive for Heat-island: The main cause of urban heat-island effect is the modification of the land surface by urban development as well its geometric effects. The tall buildings within many urban areas provide multiple surfaces for the reflection and absorption of sunlight, increasing the efficiency with which urban areas are heated. This is called the "urban canyon effect". Heat released by roof tops an important contributor to higher layers warming. With these conditions, the temperature increases with the height as against adiabatic lapse rate, and known as thermal temperature inversion. With this, though upper portions are supposed to be cooler are now warmer. The other reasons for the night-time warming are (comparatively warm) buildings blocking the view to the relatively cold night sky; changes in the thermal properties of surface materials; and lack of evapotranspiration in urban areas; buildings blocking of wind, which also inhibits cooling by convection. Materials commonly used in urban areas, such as concrete and asphalt, have significantly different thermal bulk properties (including heat capacity and thermal conductivity) and surface radiative properties [reflection (albedo), absorption and emission] than the surrounding rural areas. This causes a change in the energy balance of the urban areas, often leading to higher temperatures than surrounding rural areas. The energy balance is also affected by the destruction of vegetation & water bodies in urban areas, which inhibits cooling by evapotranspiration. The hottest buildings often were the newest. Waste heat

generated by energy usage is a secondary contributor. Waste heat from automobiles, air conditioning, industry, and other sources also contributes to the urban heat-island. High levels of pollution in urban areas can also increase the urban heat-island, as many forms of pollution change the radiative properties of the atmosphere.

Impacts of heat-island: The impact of heat-islands are observed in increased electricity use, greenhouse gases emissions, deterioration of air & water quality, weather modification & impact on health & welfare. Aside from the effect on temperature, urban heat-islands can produce secondary effects on local meteorology, including the altering of local wind patterns, the development of clouds and fog, the humidity, and the rates of precipitation. However, the intensity of these changes depends upon prevailing local conditions, particularly urban growth, air pollution & geography. Research shows that electricity demand for cooling increases 1.5–2.0% for every 0.6°C increase in air temperatures, starting from 20 to 25°C, suggesting that 5–10% of community-wide demand for electricity is used to compensate for the heat island effect.

In addition to their impact on energy-related emissions, elevated temperatures can directly increase the rate of ground-level ozone formation. Ground-level ozone, which is also a greenhouse gas, is formed when air pollutants such as NOx and volatile organic compounds (VOCs) react in the presence of sunlight and hot weather. If all other variables are equal, such as the level of precursor emissions in the air and wind speed and direction, more ground-level ozone will form as the environment become hotter/sunny.

Hot pavement and rooftop surfaces transfer their excess heat to storm water, which then drains into storm sewers and raises water temperatures as it is released into streams, rivers, ponds, and lakes. Rapid temperature changes can be stressful to aquatic ecosystems. Heat-islands have the potential to directly influence the health and welfare of urban residents. Increased daytime temperatures, reduced nighttime cooling, and higher air pollution levels can affect human health by contributing to general discomfort, respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke, and heat-related mortality. The relationship between extreme temperature and mortality varies by location. Heat is more likely to increase the risk of mortality in cities with significant annual temperature variation. In contrast, in cities that are mild to hot year-round have a lower public health risk from excessive heat as people in such cities tend to be acclimated to hot weather conditions and therefore less vulnerable to heat related deaths. This is also the same with the impact of heat waves added to heat-island effect.

Mitigation Measures: The extent to which urban areas can benefit from heat island reduction strategies depends on a number of factors such as agencies

and planning. However, some, such as prevailing weather patterns & climate, geography, and topography at any given area are beyond community's control but we have to plan.

Typically heat-island mitigation is part of a community's energy, air quality, water, or sustainability effort. Decision makers can select a range of energy-saving strategies that will generate multiple benefits, including vegetation, landscaping, and land use design projects, and improvements to building and road materials. Water bodies, trees, vegetation, and green roofs can reduce heating and thus through cooling energy use could be reduced and also could be reduced the associated air pollution and greenhouse gas emissions, etc. All these indirectly relate to pollution free public transport system such as rail mode & changing fuel from oil mode to gas mode; implementation of good urban planning with building and zonal regulations; and implementation of Scientific Vastu/ green building concept/building codes – not the one practiced now-a-days, known as business/commercial Vastu. For example, Feng-Shue, which is nothing but associated with wind and water. Thus, most mitigation activities have multiple benefits, including cleaner air, improved human health and comfort, reduced energy costs, and lower greenhouse gas emissions.

The other important area is selection and planning of building material and planning including pavements — pavements include roads, parking lots, driveways and sidewalks. They play vital role in terms of albedo/reflectivity, absorption & emission factors of energy balance. This is a long established practice that white bodies reflect more and absorb & emit less while black bodies reflect less and absorb and emit more The range of possible values is from 0 (dark) to 1 (bright). Emission is a measure of how well a surface emits or releases heat. It is a value between 0 and 1. Vegetation and water bodies play the major role in cooling through evapotranspiration as well balancing the greenhouse gases. Therefore, it is important to preserve & protect and improve the areas under water spread and greenery. Some of these could be executed by local authorities and some by community and some by individuals. Civil engineers play vital role in all these areas.

Twin cities: As an Example

To understand the scenario of heat-island in climate change perspective of twin cities, four issues, namely town planning, traffic & transportation & air pollution, and water bodies & greenery are discussed in brief.

Town Planning: Mohd Quli Qutub Shaw on the banks of Musi River found Hyderabad in 1591. The city has a glorious tradition of lakes and gardens built by the rulers – Qutub Shaw during 1564-1724 A.D. and Asaf Jahi during 1724-1948 A.D. They also developed excellent town planning & drainage system.

Now, unfortunately we are unable to protect even that also. The present day master plans have become postmortem reports with rampant violations/ corruption which are later legalized for a prize. State governments are looking at short-term monitory gains through legalizing illegal constructions forgetting the multifold losses on long-term. As a result, the density of population has increased from 2596 persons/sq. km. in 1901 to around 26,000 persons/sq. km by now in the core area and yet encouraging land use changes in this zone. The town planning and traffic & transportation define the congestion level and indirectly the dispersion capacity of the ambient. All these are contributing to heat island intensification in twin cities as well greenhouse gases emissions. Unfortunately, at present realtors are the main advisors to government. It is a dangerous trend and thus kills the sustainable development. Therefore, there is a need to stop rampant corruption in town planning.

Traffic & Transportation: Hyderabad has the lowest % area of roads (6% while Delhi has the highest with 20%) and the highest vehicle density per square kilometer (2337 while Delhi has the lowest with 184). Widening of the roads, building flyovers, etc only tend to increase the number of vehicles coming on the roads making things worse further. Building more roads to ease urban traffic is like trying to cure obesity by loosening the belt. Road users of all types are the most uncivilized violators of laws that are creating traffic and transport problems in numerous ways. The alternative of public transport system, should be less capital intensive, fuel efficient, affordable, safe, fast and should blend with the character and heritage of the city without defacing them and becoming an eye-sore. In this direction the government has submitted an action plan to Hon'ble High Court in 2005. Private passenger transport is estimated to consume about 20 times the energy required for public transport buses, per passenger kilometer. Rail systems, which are the most powerful, and energy efficient system, having the highest hourly passenger carrying capacity, require much less energy than the buses. It may not be practicable to provide high speed, high capacity BRTS facility, through congested roads with numerous intersections in down town/core area of the city. However, government is looking at introducing this system in some corridors!!! The first proposal of HATS, recommended the introduction of Mass Rapid Transit Services on the existing railway network to reduce the dependence on private modes of transport. Now MRTS phase-I completed – on existing tracks — and is in operation. Phase-II connecting rural routes in five corridors covering an area of 148 km is yet to be taken up. However, to meet the transport needs of core area government proposed Metro Rail (MRTS) in three corridors covering around 70 kms. Though it is capital intensive but it is the only way one can go to develop sustainable and faster mode of transportation in core areas.

Air Pollution: It is associated with industry, automobiles, disposal of biomedical waste & biodegradable waste, burning of non-degradable waste such as plastic & PVC pipes, building activity, burning of degradable waste (Municipal Solid Waste at dumps, around the city), mining activity, forest fires, etc. In twin cities of Hyderabad & Secunderabad, vehicular pollution contributes around 80% of air pollution. The air pollution load, due to automobiles, at any given point is a function of no. of vehicles, fuel type and dispersion capacity of the ambient. Twin cities are currently facing the problem of traffic congestion, which has attained the menacing proportions of traffic jams with around 24 lakh vehicles on roads with a growth rate of more than a lakh per year along with around 5 lakhs of floating vehicles. But the pollution on account of smoking vehicles passing in large numbers on the roads has indeed become a health hazard and a matter of great concern. The out-patients at Chest Hospital increased from 22,026 in 1999 to 53,187 during 2003. The same in the case of in-patients increased from 4918 to 7055. The pollutants in general started declining up to around 2004 with new automobile models with less pollution potential and as well fuels with reduced levels of pollutants; and again started increasing with increasing vehicle numbers and associated congestion factor after around 2003/04 (Table 1). The impact of adulterated fuel is clearly evident from this table. Where the dispersion capacity is good like in the case of KBRN & Zoo Parks the pollution levels are far lower than those at poor dispersion capacity like Paradise, Abids & Panjaguutta areas. Both high Court & Supreme Courts have directed the government to implement a plan of action to bring down the pollution load but things are going on as usual and the government unable to stop even the sale of adulterated fuel; which is contributing around 45% of pollution load in twin cities. Under this scenario, to reduce air pollution, there is an urgent need to (i) Expedite all modes of rail based transport systems; (ii) Control with heavy hand on adulterated fuel sale; (iii) Clean-up road sides by: Junk food vendors; Dubbas/huts; Parking of vehicles; Places of worship; Electrical/Telecom poles, etc.; (iv) Implement some basic traffic rules to provide free flow of vehicles; (v) Implement green fuel use in transport; (vi) Stop parking on the roads with heavy hand; & (vii) Educate APSRTC & auto drivers.

Water bodies & Greenery: In and around Hyderabad there used to be 932 lakes/tanks and around more than 50% of them were encroached and converted into concrete jungle. Even in the case of remaining lakes, the area reduced through illegal encroachments and some are polluted. Here law of jungle applies and even the court directions are put in dust bins. In addition to realtors, the two major culprits of destruction of water bodies are the departments of Tourism & APIIC of government. In the case of drainage system, both rainwater & sewerage, developed by rules of the day are also either destroyed or encroached indiscriminately and as a result during rainy seasons

the roads are flooded with the drainage/rainwater causing traffic hassles. Groundwater is being extracted indiscriminately without adequately compensating to fill the groundwater also affecting the greenery and creating dryness. Around 30 to 40% of water is wasted through leakages, pilferage, wasteful use, etc. Around 70% of the water supplied by metro water board and groundwater extracted from individual bore wells turn into sewage. Now, it is around 1500 mld and with the time it will go up. At present government established/establishing sewage treatment plants (STPs) covering around 700 mld, which is not even 50% of sewage generated. Also not even 50% are effectively operated. Unfortunately at present untreated, partially treated & treated industrial effluents are either directly or through STPs is joining Musi River. Using this contaminated water food is produced in the downstream of Musi River. Destruction of green belts is going on in the name of roads widening, development of colonies, infrastructure development, etc. Government departments are the main culprits in the destruction of trees & green covers; they are not sparing even 100-year old trees. WALTA (2002) act was issued to protect trees as well digging of bore wells but not effectively implemented as well it itself have loop holes. Under this scenario (i) Restore & protect water bodies; (ii) Create Metropolitan Urban Lakes & Drains Authority; (iii) Re-use waste water (domestic sewage) – see not to mix with industrial effluents – formulate a separate authority to look after STPs; (iv) Control industrial effluents not to join water bodies/groundwater. They could be treated at source and used locally for greenbelt development; (v) Save water and reduce wastage; etc. (vi) Protect & Improve Green cover; (vii) Control indiscriminate digging of bore wells; & (viii) Introduce more teeth to WALTA Act of 2002.

Summary

Urban heat-island, one component of climate change, in a broad sense is principally defined by urban planning in terms of land use & land cover changes and traffic & transport system. Thus, urban heating is a function of ambient dispersion capacity and pollution load at any given point or location. Some of the factors related to congestion are road width, building density both horizontal and vertical growth, change of land use, areas covered by open areas, greenery & water bodies.

Civil engineers play vital role in the reduction of urban heat-island and its associated impacts through (i) advising the government in the implementation of laws and enactment of laws related to urban planning; (ii) by selecting proper designs and materials in the construction activities; (iii) more specifically in the implementation of green building concepts/building codes/scientific vastu principles within the frame work of existing laws; etc. However, in all these local governments, communities and individuals participation is critical to achieve the stated goals.

Reduce power use through the use of renewable energy/solar energy; energy saving practice & energy efficient appliances; etc. Government must come forward to provide "tax benefits" to house owners/colonies that come up with the development of green belts, construction of water ponds & sewage treatment plants, use of renewable energy/solar energy; energy saving/water saving, etc.

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పోలవరం డ్యాంపై వితండవాదం

డా॥ సజ్జల జీవానందరెడ్డి

వార్త, 21 అక్టోబర్ 2009లో ప్రచురించిన డా. పెంటపాటి పుల్లారావు వ్యాసం "పోలవరం ప్రాజెక్టు రద్దు నబజే"లో చర్చించిన వివిధ విషయాలను చూసినట్లయితే, వీరికి డ్యాంలు అంటే అర్థం తెలుసా అనే అనుమానం రాకమానదు.

పోలవరం ప్రాజెక్టుకు రూపకల్పన 1947-48లో జరిగితే, దీనికి పునాదిరాళ్లు 1982లో వేయడం జరిగింది. ప్రాజెక్టు 2004లో మొదలవడం జరిగింది. డౌన్‌టు ఎర్త్ మేగజైన్ (జనవరి 31, 2008)లో పోలవరం ప్రాజెక్టుపై "పోలవరం రాంగల్" అనే ప్రత్యేక రిపోర్టులో పొందుపరిచిన కొన్ని విషయాలను చూద్దాం.

(ఎ) ముంపుకు గురయ్యే విస్తీర్ణం (హెక్టార్లలో):

మన రాష్ట్రంలో	60,063
ఛత్తీస్‌గఢ్‌లో	2,398
ఒరిస్సాల	1,230
మొత్తం	**63,691**

(బి) ముంపుకు గురయ్యే గ్రామాల సంఖ్య:

మన రాష్ట్రంలో	250
ఛత్తీస్‌గఢ్	13
ఒరిస్సాలో	13
మొత్తం	**273**

(సి) కృష్ణా బేసిన్‌కు నీళ్ల తరలించే విషయంలో గోదావరిలో 'సర్‌ప్లస్' నీళ్ల ఉన్నవా లేక "డెఫిసిట్" నీళ్ల ఉన్నవా అనే దానిపై చర్చలో ఎన్‌డబ్ల్యుడిఎ (నేషనల్ వాటర్ డెవలప్‌మెంట్ ఎజెన్సీ) ప్రకారం సర్‌ప్లస్ (+15, 171 ఎంసిఎం) అయితే ఐడబ్ల్యుఎంఎ (ఇంటర్నేషనల్ వాటర్ మేనేజ్‌మెంట్ ఇన్‌స్టిట్యూట్) ప్రకారం డెఫిసిట్ (-37,199 ఎంసిఎం).

పైన పేర్కొన్న విషయాలను పరిగణనలోకి తీసుకున్నట్లయితే పుల్లారావు పోలవరంపై చెప్పేవి గాలికబుర్లే, సత్యదూరమనే అర్థమవుతున్నది.

పుల్లారావు "డ్యాంలు కట్టడం వల్ల ప్రయోజనమేమిటి?" అనే వ్యాసంలోని అంశం కింద భారీ ప్రాజెక్టుల వల్ల వచ్చే ముప్పు గుర్తించి వాస్తవాలు చెప్పకుండా ప్రభుత్వం పోలవరం ప్రాజెక్టు నిర్మాణం చేపడుతోంది. భారీ ప్రాజెక్టులు వరదలను నివారించ లేవని రుజువవుతున్నా ఈ నిర్మాణం ఆగడం లేదు. దీనిని విశ్లేషించేటప్పుడు ఈ సంవత్సరం వచ్చిన వరదల విషయానికి ముందు హైదరాబాద్ వరదల గురించి చూద్దాం.

1908 సెప్టెంబర్‌లో మూసీ నదికి వచ్చిన వరదల మూలంగా విపరీతంగా ప్రాణ, ఆస్తి నష్టం జరిగింది. అప్పటికి పట్టణంగాని, జనాభాగాని అంతగా పెరగలేదు. అదే ఇప్పటి పరిస్థితులలోనైతే నష్టం-దావులు వేలకోట్ల, లక్షల జనాభా ఉండేది. ఈ వరద బీభత్సం చూసిన నిజాం భారతరత్న మోక్ష గుండం విశ్వేశ్వరయ్య, (ది లిజెండ్రీ ఇంజనీర్స్ ఆఫ్ ఇండియా) సలహా సంప్రదింపుల మేరకు హిమాయత్‌సాగర్ - ఉస్మాన్ సాగర్ జలాశయాలను 1913-27లో నిర్మించడం జరిగింది. అప్పటి నుంచి మూసీనదికి వరద తాకిడి లేకున్నా హైదరాబాద్ పట్టణానికి ఇంకొకరకమైన వరదల తాకిడి ఆనవాయితీగా మారింది. హైదరాబాద్ ఫ్లట్టువక్కల ఉన్న చెరువులు, కుంటలు, మూసీనది, డ్రైయిన్స్ పూడ్చి కాంక్రీట్ జంగిల్‌గా మార్చడంవల్ల లోతట్టు ప్రాంతాలు జలమయమవడం జరుగుతున్నది. హుస్సేన్‌సాగర్‌ను 5000 ఎకరాల నుంచి 900 ఎకరాలకు కుదించడం ద్వారా, దానిలోతు మూడు వంతుకు పడిపోవడంవల్ల దిగువ ప్రాంతాలు 2000 సెప్టెంబర్‌లో వరద బీభత్సం జరిగింది. పాతబోయనవల్లిలోని ఇక్రిసాట్ కాలనీ-1 మూడుసార్లు వరదల్లో మునిగింది. మూడవసారి బోట్ల సహాయంతో తరలించడం కూడా జరిగింది. దీనికి కారణం ఆ చుట్టువక్కల ఉన్న మూడు చెరువులు కనుమరుగవడమే. అలాగే విజయవాడలో కూడా డ్రెయిన్స్‌లో చెత్తాచెదారం పేరుకుపోయి కొన్ని ప్రాంతాలు జలమయమవడం జరిగింది. ఇవన్నీ కూడా ఆయా ప్రాంతాలలో పడిన వర్షాల వల్లే జరిగిన నష్టం ఇదంతా మానవ తప్పిదం వల్ల జరిగిన దుష్ప్రభావమే. ఇలాంటి తప్పిదమే కర్నూలుకు శాపంగా మారింది ఈ సంవత్సరం. ఇంతకుముందు రెండు సంవత్సరాలు వరదలలో చిక్కుకుంది. దీనికి ముఖ్యకారణం పట్టణాభివృద్ధి సక్రమంగా జరగలేదు. హంద్రీ నదిలో, లోట్టు ప్రాంతాల్లో డ్రెయిన్లు పొంగి వరద రావడమే. ఇవన్నీ కూడా డ్యాంలకు సంబంధం లేనివే.ఒక ప్రాజెక్టు ముంపు ప్రాంతాల్లోని ప్రజలకు నష్టపరిహారం ఇచ్చినా, అక్కడనే నివాసం ఉంటూ వ్యవసాయం కొనసాగిస్తున్నారు. అందువల్ల వరదలొస్తే ప్రభుత్వ వ్యవస్థ అంతా దెబ్బతినడమేగాక, ప్రాణహాని, డబ్బు ఖర్చు జరగటం మామూలే ఉన్నాం. అంతేకాదు, కాలువలకు/కరకట్టలకు గండ్లు వేసి నీటిని వాడుకోవడం ద్వారా వరద బీభత్సంతో ప్రజలను అతలాకుతలం చేయడం జరుగుతుంది. విజయవాడ నది ఒడ్డున ఇళ్ల నిర్మించుకోవడం జరిగింది - హైదరాబాద్‌లోలాగా. ఇవన్నీ కూడా వరదలకు మానవ తప్పిదాలు. ఇవన్నీ ఈ సంవత్సరం వరదలో వెలుగులోకి రావడం జరిగింది.

కృష్ణా నది వరదల విషయానికొస్తే ప్రకారం, శ్రీశైలం-నాగార్జునసాగర్ జలాశయాలు నిర్మాణం జరగకముందు వరద ఉధృతి ఎక్కువగా ఉండేది. కానీ జలాశయాలు కట్టిన తరువాత వీటి ఉధృతి తగ్గింది. (1983, 1998, 2005, 2009 తప్ప). అంటే పెద్ద డ్యాంల వల్ల వరద ఉధృతి తగ్గిందేగాని పెరగలేదన్నమాట. ఇప్పుడు మనం, ఎక్కువ వరదలు వచ్చే వర్షపాత 30 సంవత్సరాల వలయం కాలంలో ఉన్నాం.

గాలికబుర్లు చెప్పడం తేలికేగాని, ఆదే గణాంకాలతో విశ్లేషించినప్పుడు పాలకపాలు-నీటికి నీళ్ల బయటపడుతుంది. మన రాష్ట్ర వర్షపాత గణాంకాలు చూసినట్లయితే, వర్షపాతంలో పెరగుదల కనిపిస్తుంది. అయినప్పటికి వరద ఉధృతి తక్కువగానే ఉంది. దీనికి కారణం కృష్ణా నదిపై నిర్మించిన ఆనకట్టలే. ఇక్కడ మనం తెలుసుకోవాల్సిన ముఖ్య విషయం. ఈ సంవత్సరం వరదకు ముఖ్యకారణం - ఇది మానవ తప్పిదం మూలంగా ఉధృతి పెరిగింది. శ్రీశైలం డ్యాం నుంచి అక్టోబర్ 1 నుంచి వదలి ఉంటే ఈ వరద ఉధృతి అంతగా ఉండేది కాదని అందరూ ఆంగీకరించిన నగ్నసత్యం.

మనదేశ నైరుతి రుతుపవన వర్షపాతంలో 60 సంవత్సరాల వలయం ఉంది. మన తెలుగు జ్యోతిష్య శాస్త్రంలో వాడుకలో ఉన్న 60 తెలుగు సంవత్సరాలు. ప్రభవ 1987-88లో మొదలై అక్షయ 2040-47తో అంత మవుతుంది. ఈ 60 సంవత్సరాల వలయం 1990-91లో మొదలైంది, 2049-50తో అంతమవుతుంది. దీనిలో మొదటి 30 సంవత్సరాలు సగటుకంటే ఎక్కువ వర్షపాతవలయం. గతంలో పల్లెలు, పట్టణాలు అంతగా పెరగకపోవడం, జనాభా బాగా తక్కువగా ఉండటం, సాగువిస్తీర్ణం తక్కువగా ఉండటంమూలంగా నష్టం ఎక్కువగా కనిపించేదికాదు. ఇప్పుడు జనాభా పెరిగింది. వీటికి అనుగుణంగా పల్లెలు, పట్టణాలు పెరిగాయి. సాగు విస్తీర్ణం పెరిగింది. అంతేకాదు డ్రైనేజీ వ్యవస్థ నాశనమైంది. దీనివల్ల నష్టాలు వివరీతంగా పెరిగటం జరుగుతున్నది. దీనికి తోడు ప్రజల, అధికారుల, ప్రభుత్వాల అలసత్వం - అంటే తప్పిదాల వల్ల ఈ నష్టాలు ఇంకా పెరగడం జరుగుతున్నది. ❑

Appendix – III: Climate Change: Myths & Realities

[Paper presented (Invited Talk) at 25th National convention of civil engineers & National seminar "Climate change abatement – Role of civil engineers" held at Institute of Engineers (India) Andhra Pradesh Centre during 23-24 October, 2009, proc. — pp. 31-35.]

Climate Change: Myths & Realities

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Abstract

Climate change is a vast subject but can be divided into two parts, namely one is inbuilt in nature that is beyond man's control and thus one has to adapt to it; and other is induced by man that is in the hands of man but it is now becoming quite complicated with population growth and uninterrupted urban migration and development of infrastructure to meet their new demands under the new technological innovations. The implications of some of these are seen in land use and land cover changes that come under ecological change. Most of the civil engineering activities involve land use and land cover changes. All of these have both direct & indirect affects on weather & climate and greenhouse gases at all spatial scales. It revolves around energy production, use and saving methods both directly or indirectly. In this presentation some of these issues are discussed in brief with reference to civil engineers role in the mitigation measures.

Introduction

Now-a-days every thing has become unusual and try to attribute to some thing we don't have the comprehensive knowledge like a blind man using a light pole. Most unfortunately, man on the street to Editor of scientific magazines talk of climate change at the same wavelength, and thus science of climate change became a scapegoat. Thus, the "Science of Climate Change" has turned into a political satire of "Global Warming & Carbon Credits". IPCC is giving weight to number rather than to science. In this process the major casualty is the health of life forms on the Earth, more particularly in developing countries, most of which are located in "warm" tropics. The article, in brief, makes a step in this direction with reference to civil engineering activities in climate change perspective in its' totality by defining what is the role of civil engineers, what is climate change and how, where and in which way civil engineers help in mitigating the expected impacts of climate change.

What is the role of Civil Engineers?

Civil Engineering activities vary from simple house building to mega infrastructure projects such as roads, mass transit, railroads, bridges, airports, dams, industry, etc. It is clear from this that civil engineering activities primarily related to changes in "land use & land cover". Thus, majority of civil engineering activities affect weather & climate either directly or indirectly at primary level or at secondary level. Civil engineering projects and systems should conform to governmental regulations and statutes on the one hand and infrastructure projects require environmental clearance (EC) from MoEF. Environmental Impact Assessment [EIA] is a part of this game. Each major activity impacts the environment in a variety of ways. EIA, in brief, extrapolate from scientific knowledge to assess the problem consequences of some human interventions on nature, that provides means to understand the way one can counter the impacts on environment and suggest mitigation measures. Site selection process is an important component in any infrastructure projects that have minimal effects on the environment, as the proponents – politicians – bureaucrats look at their vested interest point of view.

Marcus Vitruvius Pollio, the Roman Architect of the first century BC, wrote a treatise on architecture in which climate was taken into account – this is also referred under MCH Town Planning Manual. The World Meteorological Organization (WMO) publication underlines the adaptation of buildings to regional climate for improving comfort. In this, cited the Palace of Justice in Klungkung, Chief City of Bali (Indonesia), built in 1710 as a classical example. In most of the Indian temples we find in their construction adaptations to local weather & climate. The selection of plots vs roads in Tamil Nadu & Telangana relates to prevailing monsoon rainfall systems. In Hyderabad and its' surrounding districts use central opening to get ventilation and good air. Also, rainwater that comes from the slant roofs towards the central opening can be collected into a sump. Generally, this is referred to as Scientific Vastu – not the present commercial Vastu. Feng-Shue, the Chinese Vastu, means "wind and water" that relates to counter the summer heat and winter cold. This is traditional wisdom and now we got building codes, green building concepts to reduce the impact on environment and more particularly on weather & climate. Our rulers used to plant trees on either side of the roads and water pond or a river is an important component taken into account while planning a village or a temple. Now we are destroying everything what they developed!

What is Climate Change?

Climate Change: The term "climate" refers to the "weather" over very long periods, while weather is what we experience daily. In short, climate is the description of the long-term pattern of weather. The weather and climate vary with both space and time. Climate change is a change in the average weather

with the time, which has two components namely natural variations in built in nature that are beyond human control and the other one is human induced change (see Reddy, 2008, www.scribd.com). The natural variations in turn have two components, namely irregular variations and systematic variations. Inter-seasonal and inter-annual variations are known as irregular variations. With the uninterrupted population growth, their new life styles and accordingly to meet these life styles new technologies, changing the climate but are not the same at all places. Thus, the actions of man also have an impact on climate. This is reflected in the form of increasing or decreasing trend. This has got in turn two components associated with changes in anthropogenic gases (greenhouse gases) and its' impacts are expressed as global warming & ozone depletion; and ecological changes and their impacts are expressed in changes in weather & climate that include urban heat-island & rural cold-island affects and changes in greenhouse gases balance.

Global Warming: The fact is that both the ozone "creation & destruction" in stratosphere and "cooling & warming" of temperature (surface and atmosphere) are in built in nature. There is an absolute one-to-one relation in ozone depletion theory and thus, though in the initial stages there was a stiff opposition from industry it became easy to replace ozone depleting substances by non-ozone depleting substances. Unfortunately, there is no such one-to-one relation in global warming theory, as there are several processes involved and many of them are not systematized or understood. However, it is a fact that average global temperature has increased by around 0.8 °C in two intervals of time during the last 100-years (around 1910-1940 & 1980-2005).

Sophisticated computers provided big hype and thus science of climate change is polluted with mind boggling/sensational news that fetching huge funds for such studies. One such prediction is on cereal production in which raise in temperature by 2 °C, production will be reduced by 6% in developing countries and will be increased by 15% in developed countries. These estimates are based on Western crop-weather models; on testing at ICRISAT it was found that they are poor predictors. Such model predictions in the case of sea level rise, the model errors are far higher than the expected rises in sea levels – observed data suggests, rising, lowering, no change. In the case of glaciers retreat, the predictions have no capacity to integrate localized factors & ground realities while assessing the cause and affect – example is GSI data for India.

Systematic Variations: The systematic variations are also known as "climatic cycles" or "fluctuations". This part of the climate is generally referred to as "climate change". They are of two types, namely long-term fluctuations seen in temperature known as ice ages and short-term fluctuations like rainfall cycles. Climatic cycles in annual or seasonal rainfall means, it shows above the average pattern for some continuous years followed by about the same number

of years of below the average rainfall pattern with few exceptions and this repeats itself with the time as was the case with Astrological cycles and Sunspot cycles & Solar flares. Where such cycles are present the "normal" has no meaning. The author observed such cyclic variations in precipitation data series of Brazil, South Africa, Botswana, Mozambique, Ethiopia, etc. The longest cycle of 66 years was recorded in Durban/South Africa as well in Canberra/Australia. The shortest cycle of 22 years was recorded in Asmara in Eritrea (formerly in Ethiopia). The author observed 60-year cycle in All-India Southwest Monsoon Rainfall – same was seen in Hurricane data series of US Coast and opposite to this pattern was seen in Pacific Typhoons. The author also observed 56-year cycle in Andhra Pradesh Southwest Monsoon Rainfall – the Bay of Bengal cyclones data series as well the global temperature followed this pattern. Exactly opposite pattern is observed in Northeast Monsoon Rainfall data series. The important point is, where such cycles are present it is necessary to impound river waters that are otherwise joining seas, in ponds/dams even by linking rivers. Otherwise we may face severe food crisis and water wars with demand for water increasing day by day with uninterrupted population growth and rural to urban migrations. Agriculture must be adapted to such variations through detailed agromet studies (Reddy, 1993 & 2002).

Ecological Changes: In addition to changes in the atmosphere's composition, changes in the land use & land cover, known as ecological changes, can have important effects on climate. There are several possible forces driving land use and land cover changes, primarily related to population & their lifestyle and technology and extension of basic transport infrastructure. The existence and accessibility of transportation routes have often dictated patterns of urban growth. Urban areas that were established in the 18th and early 19th Centuries were usually located along waterways, reflecting dependence on shipping for the transportation of goods and people. By the middle of the 19th Century, railroads began to connect existing towns and spurred the growth of new urban areas. The post-World War II era saw not only an increase in the population of most metropolitan areas, but also the emergence of a society dependent on the automobile. The proliferation of the private automobile led to expansive development at the edges of urban areas. The development of the interstate highway system in the 1950's spurred the widespread construction of roads. As road networks expanded and became more complex, urban development followed. As in the past, most recent urban growth has occurred along transportation corridors.

Metropolitan areas around the globe irrespective of developed or developing nations are growing at unprecedented rates, creating extensive urban landscapes. Many of the farmlands, wetlands, forests, and deserts have been transformed during the past 100 years into human settlements, known as

"concrete jungle". Almost every one has seen these changes to their local environment. Most major metropolitan areas face the growing problems of urban sprawl, loss of natural vegetation and open spaces as well water bodies and converting these into concrete structures in both horizontal & vertical spectrum along with roads. Urban growth rates show no signs of slowing, especially when viewed at the global scale, since these problems can be generally attributed to increasing population. Cities have changed from small, isolated population centers to large, interconnected economic, physical, and environmental features. One hundred years ago, approximately 10 percent of the world's population was living in urban areas. Today, the percentage is nearly 50. In the last 200 years, world population has increased six times, stressing ecological and societal systems. Over the same time period, the urban population has increased more than 10 times; concentrating more people on less land even as the total land devoted to urbanization expands.

Thus, processes such as deforestation, reforestation, desertification, changes in topography/orography, urbanization, mining, construction of roads including railways & infrastructure, industry, agriculture – dry-land to wet-land & vice versa or grazing lands, water resources – construction of dams, etc that come under ecological changes, play important role at local & regional scales by changing the reflectivity (albedo), absorption & emission of land surface, formation of thermal inversions, etc and thus contribute to changes in temperature, humidity, wind, precipitation, evaporation/evapotranspiration, etc. Changes in land cover and land use can also affect the greenhouse gases balance in the atmosphere through direct (release of air pollutants) and indirect actions (changing greenhouse gases balance).

All over the globe it was confirmed beyond doubt that deforestation not only changed the weather (temperature, precipitation, wind, evapotranspiration, etc.) but also the greenhouse gases balance — As an example of poor road planning can be seen in outer ring road that destroyed water bodies and greenery indiscriminately. Changes in topography play an important role on precipitation. Our Indian precipitation patterns are associated to Western Ghats & Himalayan mountains box effects. In 1807 a British meteorologist observed an increase in London temperatures over the surrounding rural areas. This was confirmed by the scientists around the world. This is termed as urban heat-island effect. This also helped production of greenhouse gases. In some urban centers even the rainfall patterns changed (example Mumbai). Mining activities present similar to urbanization. The chemical inputs based agriculture has both direct and indirect affects. The direct affect is formation of cold-island effect – decrease in temperature, increase in evapotranspiration & precipitation. The indirect affects are caused through high power consumption; chemical inputs

industry causing air, water, soil & food pollution; – bulk drug industry – hospitals — pollution; a vicious circle and thus greenhouse gases emissions.

In Summary, all these, clearly reflect that ecological changes have both direct and indirect effects on weather & climate in addition to direct impact on environment & life forms on the Earth. Unfortunately, the researchers' haven't given that much importance as that given to hypothetical global warming theories as these needs only sophisticated computers without scientifically validated data sets. There is an urgent need to change the mind set in this direction to solve the climate change problem as a long-term solution at local and regional scales. From the above discussions it is also clear that ecological changes not only influence the radiation balance in the atmosphere, thus climate, but also the greenhouse gases, principally CO_2 balance in the atmosphere.

What is the Role of Civil Engineers in the Mitigation Measures?

In India around 25% is Hydropower, 66% is thermal power (around 80% of it is from coal), around 3% nuclear power and the rest renewable energy sources. Power is the major input for all developmental activities and thus we can't stop the use of fossil fuels but there is every scope to use efficiently the fossil fuels so that the emissions will be less by technology innovations and integrating these with solar power component in thermal power generation. Also the fossil fuels may not lost for long. Energy saving is another component to be looked into. In this direction by replacing chemical inputs by organic inputs in agriculture provide maximum energy savings and reduction in greenhouse gases emissions. Also, there are several such activities. More thrust must be placed in the areas of renewable energy development & research (**Appendix-IV**) – Under the National Action Plan on Climate Change (NAPCC) the Solar Power Mission under the Chairmanship of Hon'ble Prime Minister approved on 3rd August 2009 meeting the plan of action with 90 thousand crores. More research is needed in energy saving techniques & appliances.

Local and regional level point of view, the major issue of the man's intervention on nature is ecological changes, which has wide range of activities. The role of civil engineers is vital in this area. (1) The main component of ecological change is population & lifestyle and technology. The major issue under this is uninterrupted migration of rural population to urban centers. To reduce the impact, needs to control migration of rural population to urban centers for greener pastures by providing sustainable living in rural areas. To achieve this, developmental activities must go "rural" and making the agriculture sustainable by improving irrigation facilities. Here the governments' role is critical. (2) The unprecedented developments in the areas of infrastructure projects in urban centers to meet the growing population needs under the new life style & technologies are the major contributor to climate change through direct or indirect means. The main component of this is sustainable town

planning & traffic-transport systems and implementation of Green-building concepts, etc. These act as a control on heat island intensity, power consumption and release of greenhouse gases in urban centers. (3) Poor road planning is another major issue of heat-island formation and greenhouse gases emissions. Road planning must help in protecting the existing greenery & water bodies and controlling of flood water on roads with rain water and overflows from drains in rainy season. (4) Destruction of water bodies, forests/greenery, etc that severely impact weather & greenhouse gases emissions. Planning must provide sustainable environment in true sense through protecting greenery & water bodies. (5) Pollution helps augmenting heat-island effect and greenhouse gases emissions. Thus, to reduce the pollution impact, it is essential to have pollution free public transport system like rail mode through congested areas and replacing oil mode to gas mode as well control of fuel adulteration. These last two items also apply to rural transport system. The major issue is the reforestation programmes to compensate the destruction caused by mining, infrastructure development programmes and their transport corridors development. There is an urgent need to control destruction of forests & greenbelts/trees under the vote bank politics by political parties. In this context the site selection for the development of infrastructure projects is critical.

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Note 1:

To: The Editor
The Times of India
Dated 15th December 2009

Namaskar,

Here are some of my observations on an article by Amit Bhattacharya under "**SUB**VERSE" (TOIBLOGS) titled "Is climate change for real?" in The Time of India dated 15th December 2009 on page 8 for consideration of publication.

I am one of the scientist started my carrier in the area of climate change & solar radiation studies as back as early 1970s. One of my paper on impact of solar flares on the lower tropospheric temperature & pressure was identified as one of the 15 papers of unusual interest (most of them are in the field of climate change) by SCOSTEP of American Academy of Sciences as back as 1976 from the entire literature published up to that time in the field of Solar Terrestrial Physics in the world. My recent book "Climate Change: Myths & Realities" is available at www.scribd.com. The application of climate change in agricultural planning was presented in a book of mine published as back as 1993. Also I worked in several developed & developing countries as UNO Expert/Chief Technical Advisor. With this let me go on to the article in question.

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1. **Observation of Amit:** "yes, the science behind what is causing the Earth to heat up seems pretty settled. A few notable dissenters aside, a majority of climatologists believe there's strong evidence to show that fossil fuels are causing the warming".

Answer: Most unfortunately majority of the electronic & print media following Western-IPCC concept of climate change – "Majority". In science "majority" has no meaning but it must be proved scientifically. The author of the article Amit has also chosen the Western/IPCC path because he also got training in USA set-up.

The "greenhouse" effect is the heating of surface of a planet due to the presence of an atmosphere containing gases that absorbs and emits infrared radiation. Thus, greenhouse gases trap heat within the surface-troposphere system. This was discovered by Joseph Fourier in 1824. The Earth's most abundant greenhouse gases are water vapour (36-70%), carbon dioxide (9-26%), methane (4-9%), ozone (3-7%), Clouds, particulate matter, CFCs, etc. Cloud and water vapour are the major contributors for warming cooling in the atmosphere and other greenhouse gases are secondary factors. Water vapou & cloud & dust are primarily related to hydrological cycle, which vary with systematic variations in precipitation, known as climatic fluctuations or cycles, a major component of climate change. The other important factors that contribute to these are ecological changes; changes associated with land use and land cover, another important component of climate change.

The fact is that both the ozone "creation & destruction" and "cooling & warming" of temperature in the atmosphere are in built in nature. There is an absolute

one-to-one relation in ozone depletion theory and thus, though in the initial stages there was a stiff opposition from industry; it became easy to replace ozone depleting substances by non-ozone depleting substances. The reverse trend in ozone depletion is already evident. Unfortunately there is no such one to one relation in global warming theory as there are several un-understood processes are involved.

Paleoclimatological studies presented following ice-ages Ocean temperatures follow a particular rhythm. With this carbon dioxide release and absorption by oceans and sea level rise and fall follow the same rhythm. Here greenhouses gases vs temperature follows the opposite theory to global warming. Vice-versa theory is not valid!!!

2. **Observation of Amit:** "to understand whether human activity was leading to a rise in global temperatures, scientists had to build climate models based on observed data and make predictions".

Answer: The robots work what the programme tells it; and same is the case with models. Unless the physics behind the global warming is understood, the model predictions follow "Cow is white and wall is white, therefore wall is cow". There is no answer to the basic question – Why there was an increase in temperature from around 1910 to 1945 by about 0.4-0.5 degrees Celsius and why there was no change in temperature around 1945 to 1985. The models present an increase in temperature after 1985 (different models predicted different ranges of values between 2 to 6 degrees Celsius with the doubling of Carbon dioxide equivalent gases) with high degree of variations but not predicted the temperature before 1985. Why?

3. **Observation of Amit**: "The models also predict that middle of the continents warm up more than middle of oceans. Again, observations show that's the case. Models predict stratosphere cools, lower atmosphere warms. Right again. Models predict the stratosphere cools because of ozone depleting substances and relative damping. They also predict that there's more warming at night than the day. Yet again, the models get it right".

Answer: As I mentioned above it goes to the logic of wall & cow.

Let me go to ozone concept first. The atmosphere is divided into different layers. The first layer starting from the surface of the Earth is troposphere and above this is stratosphere. Tropopause separates these two layers. Under normal

conditions the temperature decreases with the height in troposphere, known as adiabatic lapse rate. Above this in tropopause temperature is same. In stratosphere the temperature increases with the height. The lower layer of the stratosphere contains ozone that regulates ultraviolet radiation part of solar radiation spectrum reaching the Earth.

Cooling in stratosphere is not due to ozone depleting substances. The observed data presents ozone depletion is more in winter and less in summer; less at equator and more at poles. That is under the colder temperature conditions ozone depletion takes place. This is the natural situation. That is the chemical action of CFCs takes place under colder temperatures. The formation of circumpolar vortex more frequent at South Pole zone compared to North Pole zone and as a result the temperatures are colder at South Pole and thus more ozone depletion compared at North Pole. The circumpolar vortex curtail the mixing of warmer middle latitude air with cold polar air and thus help more cooling in the zones of poles.

With the population growth, with new lifestyles under new technologies increased the pollution in troposphere as well growth of urban centers affected the lapse rate in troposphere. This is more prominently seen in urban areas and polluted centers. This has helped in increasing surface temperature, known as "heat-island effect" as well temperature in lower troposphere instead decreasing starts increasing until the inversion layer, that vary with the local conditions. This also introduces surface ozone a greenhouse gas. This impact is more in winters and increases with increasing latitudes. In this the water vapour (increase in humidity condition) played the major role over other pollutants. So, it is not the stratosphere cooling that is causing troposphere warming.

The continents warm up more than the Oceans are in line with our arguments that heat-island effect & observed differences in warming of southern & northern hemispheres. The satellite data that covers both the surface & the Oceans present no change in temperature but the surface observations (the so called global warming) present a change but it is not the same with the time as explained in the three segments of time period as mentioned in item 2 above. Has any model explained these? The urban-heat-island effect and inversion effects clearly demonstrate warming in night than during the day. In rural areas the day and night temperatures show wide difference but the same in urban areas no such difference due to inversions. In fact this situation more uncomforting as we go up in urban centers and there by more power consumption that help more pollution through power production.

4. **Observation of Amit:** "There are strong vested interests in letting people believe that warming is a myth. It's no surprise that a lot of climate change deniers get funds from multinational oil conglomerates".

Answer: The basic dispute is not with global warming per se but the dispute is how this is created. The basic problem with Amit is that like all others consider global warming is a de facto climate change. But, unfortunately it is not true. Global warming is one component of climate change only. IPCC & Al Gore groups created around 300 PR groups (trained in USA and India) to canvass the global warming as proposed by IPCC. With the PR campaign unleashed globally fetched Al Gore & IPCC noble prize, which has become like our Padmasree awards. Billions of dollars are given [some of them were taken into IPCC bandwagon] to PR groups & NGOs who are working on these lines. None of these groups have basic knowledge – some film stars are also members of Al Gore PR group got training in USA — on the climate change except the internet data & advocating IPCC philosophy. These are the groups with Western fund make films with false propaganda and put on TV channels to serve their Western bosses interests. The CDM is the path through which these groups are minting millions of dollars. Even at Copenhagen the countries are looking at how much we get by nations & Ngo-groups?

Here, even if we accept Amit's observation that "climate change deniers get funds from multinational Oil Conglomerates", under fossil fuels there are several components like coal, gas, etc. Coal is the major input into highly polluting Thermal power industry, which has nothing to do such agencies. Oil's contribution when compared to coal is negligible. The other major contributor of pollution is the agricultural chemical inputs that create direct pollution through manufacture industry; and indirectly create soil, water, air & food pollution that created new health hazards. To cure these more factories for production of medicine, hospitals to treat patients and thus it in turn created more pollution and more power consumption and as a result more power production-pollution.

Note 1: The Times of India, dated 16th December 2009 on page 8 "An inconvenient truth: Gore's Hagen blunder". Gore had stated that the latest research showed that the Arctic could be completely ice-free in five years. In his speech, Gore told the conference at Copenhagen "These figures are fresh. Some of the models suggest to Dr. Wieslav Maslowski that there is a 75% chance that the entire noth polar ice cap, during the summer months, could be completely ice-free within five to seven years". However, the climatologist

whose work Gore was relying upon, dropped the former vice-president in the water with an icy blast. "It's unclear to me how this figure was arrived at", Dr. Maslowski said. "I would never try to estimate likelihood at anything as exact as this". Gore's office later admitted that the 75% figure was one used by Dr. Maslowski as a ballpark figure several years ago in a conversation with Gore. The embarrassing error cast another shadow over the conference after the controversy over the hacked emails from the University of East Angilas Climate Research Unit, which appeared to suggest that scientists had manipulated data to strengthen their argument that human activities were causing global warming.

Note 2: The Times of India, dated 22nd December 2009 on page 10 "Pachauri slams conflict of interest charges": In grave charges against one of the world's most visible climate warriors, Rajendra K Pachauri, Chairman of UN's Noble-winning Intergovernmental Panel on Climate Change, has been accused in a British newspaper (The Telegraph, London) report of misusing his position to amass a "fortune" through his links with "carbon trading" companies. Pachauri dismissed the charges as "a pack of lies. – all my dealings are totally above Board". One of the report's authors, Christopher Brooker, is a well known climate change skeptic. The report says "Pachauri has established an astounding worldwide portfolio of business interests with bodies which have been investing billions of dollars in organizations dependent on the IPCC's policy recommendations. Apart from listing the number of companies, banks and institutes with which the IPCC Chairman is associated – he has served in an advisory capacity include San Francisco-based venture capital firm Siderian, Credit Sulsee bank, Rockfeller Foundation, Risk Governance council in Geneva, New York-based investment fund, Pegasus, and the Asian Development Bank. He also took up recently the post of the Head of the Climate and Energy Institute at Yale University In addition his present position in TERI in New Delhi, which was a preferred bidder for Kuwait contracts to clean up the mess left behind by Saddam Hussein in their oilfields in 1991 in which the $3 billion cost of the contracts has been provided by the UN. The basic quest is should Pachauri indulge in participation in such a large agencies/organizations/institutes being a Chairman of IPCC, which takes decisions involving those bodies? Has he got so much time to spend? This itself clearly reflect, though Pachauri may slam the charges by the London newspaper, that there is a truth in what the paper said on conflict of interest. Normally, people holding such a position; indulge in taking up/becoming part of self interested groups/agencies. This story clearly demonstrate my point that "The science of climate change is revolving around global warming & Carbon Credits"

Thanks

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Note 2:

From: Jeevananda Reddy <jeevanandareddy@yahoo.com>
To: WaterWatch@yahoogroups.com
Cc: indiaclimatejustice@gmail.com
Sent: Sun, November 29, 2009 4:01:24 PM
Subject: Re: [WaterWatch] (indiaclimatejustice) Please SIGN-ON: COPENHAGEN: Memorandum to the PM on Climate Change

Namaskar,

The following are some of my observations on the memorandum to be submitted to government of India in light of the upcoming 15th Convention on Climate Change at Copenhagen from 7-18th December 2009 by several organizations. The letter looks like any other political speech presented by Indian politicians outside India.

The first few paras of preamble to the letter goes into more theoretical/ rhetoric rather than practical issues. For example –

(i) "We believe that the economic and political issues of inequality —— beyond what the Earth can absorb", such statements were also made by former PM, Atal Bihari Vajpayee in his lecture in a foreign university some years back (I quoted this in book also) but implemented policies exactly opposite but we are using global warming as "adjective" to such issues forgetting the basic issue of "population & urbanization".

(ii) "Climate change has become a serious threat to the poor —— causing unprecedented floods and soil erosion in some places — disappearance of small glaciers and receding of large glaciers —— agrarian distress and mass abandoning of livestock —— reduced growth of forests and grasslands — supply water for drinking and for livelihoods at many places — ingress of saline water due to storm surges — will happen simultaneously, hitting the poor in different regions" &

(iii) Mitigation, adaptation, technology, finance issues are concerned government of India has already brought out NACPCC and in which 8 action

plans. However, the group argues "formulation and finalization of India's National Action Plan on Climate Change (NAPCC) and its eight missions as undemocratic and unilateral —— people's control mechanisms over the commons — along with deepening the control of multinationals over our food chain, etc".

(ii) & (iii) were not based on facts but from fiction – see below on this.

The government of India proposed to cut down direct + indirect emission equivalents of about 25%. When we look into government of India 's eight proposals under NAPCC, the first two relates to alternate energy sources – direct + indirect – and 3 to 7 relate to control changes associated to ecological changes. The 8th one is related to research in climate change.

Most of the Western funded NGOs, PR groups of Al Gore & IPCC think & propagating global warming is the de facto climate change. With this we are making all types sensationalizing reports to create panic among public & policy makers.

- Very recently, I saw a training manual to teachers and students on global warming. They presented in that manual that ozone depletion helped to increase the temperature by 0.3 °C. In fact the chemical process of ozone depletion takes place under colder temperatures (because of this the depletion increases from equator to poles and from summer to winter). The more frequent formation of circumpolar vortex at south pole zone helps bringing down the temperature more at south pole than at north pole and more ozone depletion at south pole;
- No body explained so far exact relationship between temperature rise and carbon dioxide (equivalent) . For example (a) why the temperature rise was far less in Southern Hemisphere compared to Northern Hemisphere; (b) why the temperature rise was around 0.4 °C during around 1910 to around 1945 and no change there onwards upto around 1985; etc
- In the case of All India July rainfall, during 1871 to 1994 (124 years), the average rainfall was 274.5 mm, the lowest rainfall was 143.6 mm and the highest rainfall was 346.1 mm. Of the 124 years in one year the rainfall was less than 150 mm; in 4 years it was between 150 and 200 mm; in 19 years it was between 200 and 250 mm; in 73 years it was in between 250 and 300 mm; and in 27 years it was more than 300 mm. This clearly reflects the variability in July month rainfall even before the global warming phenomena;
- The same in the case of the three meteorological subdivisions of Andhra Pradesh, namely Coastal Andhra/Rayalaseema/ Telangana present even more variations. For example, less than 100 mm occurred in 31/76//06 years.
- The MoEF brought to the notice of public on Himalayan glaciers prepared by Geological Survey of India, which is monitoring them for the past several

decades – no impact on glaciers by global warming but there are other factors impacting them;

· The 12 observational sites along the Indian coasts indicate sea level falling at 4 stations and no change at 8 stations; etc.

Global warming is one component of climate change. Please refer to a publication by WMO as back as 1966, a procedure to analyze meteorological data to separate cycles & trends. Cycles refer to systematic variations that exists in nature, that repeat itself over periods – ice ages of thousands of years in temperature, sea level, carbon dioxide levels; and shorter time scale of fluctuations in precipitation, sunspots, solar flares, etc. Droughts & floods are associated with such fluctuations. My studies revealed cycles in all most all countries world over. The shortest cycle observed was 22-year cycle in precipitation data of Asmara in Eritria (double sunspot cycle) & the longest cycle of 66-year cycle in Durban precipitation in South Africa & Canberra in Australia . Andhra Pradesh rainfall presents 56 year cycle with southwest monsoon cycle in opposition to northeast monsoon cycle but the annual precipitation data presents a 132 year cycle.

Indian Southwest Monsoon Rainfall presents a 60-year cycle (similar to Indian Astrological 60-years cycle and Chinese astrological 60 years cycle). In association with this the floods in rivers follow the same pattern (Ex. Chinab, Ravi , Bias, etc). Same is the case with droughts. In Andhra Pradesh, for example Kurnool rainfall analysis presents an average of 45% of drought years but when we divided this according to the cycle, during better rainfall cycle the droughts are less than 25% of the years and during the poor rainfall cycle the droughts are more than 75% of the years. Here, one should adapt the agriculture system to such variations. I carried out such analysis for India , northern Australia , Senegal & Upper Volta, Mozambique & Ethiopia . The USA hurricane data series follow this cycle but Typhoons in Pacific Ocean present opposite pattern and thus the observed sea levels data series present rises at some places and fall at few other places & no change at few other places.

1. The global warming groups never bothered on the direct impact of pollution on life forms. India is one of the major country with more than 100 crore population is directly affected by pollution. Nearly 30 to 50% of the earnings are spent on health care. This indirectly introducing greenhouse gases;
2. The major component for such health hazards is the chemical inputs in agriculture. If we can replace chemical inputs by organic inputs we can not only bring down greenhouse gases but also health hazards;
3. By using solar energy component in thermal power plants, we can replace 20 to 30% of coal use and as well reduce greenhouse gases emissions;

4. By reducing urban heat island effect by implementing strictly better town planning by protection/improvin g greenery & water bodies and encouraging rail based transport system, we can bring down energy consumption as well greenhouse gases such ground level ozone;
5. By increasing Hydro/wind/solar power and saving energy/energy saving appliances we can bring down emissions indirectly;
6. Every body talks on thermal power and consequent emissions but no body bothered on the illegal destruction of the forests under the disguise of tribal laws. As well no body bothered on reforestation programmes; etc etc.

Finally let me ask a simple question" If you walk for an hour in the streets of Detroit in USA, you smell like a hell — cloths are dirtied". Who are those NGOs attending Copenhagen meetings?

Thanks

Dr. S. Jeevananda Reddy

Appendix – IV: Environment and Renewable Energy

[Presented (as an invited talk) at a National seminar on "Exploration for non-conventional resources: Tools & Strategies" during 30-31 August, 2002 at Geophysics Department, Andhra University, Visakhapatnam]

Environment and Renewable Energy

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Abstract

Pollution (air, water, soil & food) is the hallmark of modernism. It is not only affecting the environment but also causing numerous problems to human, animal and plant life on the Earth. Power production is part of this game. It was proposed to increase by 9% per annum by spending 15 to 19% of plan allocation. Even with this the per capita power use in relation to USA is around 3% only (this is less than even that of Pakistan and China). This is quite obvious as the population pressure per unit area reverses. Power production mainly comes from conventional sources like (1) Thermal Power: from coal, lignite, gas, oil, etc, (2) Nuclear Power: from uranium, thorium, etc, and (3) Hydel Power: from water. Thermal Power share, in India, is 73.7% of which Coal alone contributes around 84%. The share of Hydropower is 25% — this is only around 22% of potential. As on today, the power generation is not able to meet the needs of different sectors at National and state level. As the non-renewable sources are fast disappearing with increased power generation to meet the increasing needs of modern man and thereby increasing the pollution levels, there is a need to look for non-conventional sources.

There are several types of non-conventional energy sources, some are the Earth based and few others are the Atmosphere based. These include derived fuels (municipal solid waste, sugarcane waste, etc), methane gas (biomass/ cow-dung), tidal waves, sea waves, Ocean thermal, wind, solar radiation, etc. Wind power and solar power from the part of the Atmosphere sources that are renewable and free from pollution. They are highly environment friendly

sources but they have some inherent weaknesses namely (i) high cost – some argue that though initial investment is high but on long term it is compensated; (ii) location-season-specific – this is more true with wind than with solar energy. Solar Photovoltaic (SPV) technology enables direct conversion of sunlight/Solar Radiation into electricity without causing pollution. Most parts of the country are blessed with good sunshine. The average solar radiation incident over India varies from 4 kWh/day to 7 kWh/day. The solar radiation received over the Indian land area is estimated to be about 5,000 trillion kWh/year. So far a cumulative total of 50 MW of PV systems, numbering around 850000, have been deployed in the country. In addition to this solar thermal energy technologies are also in operation for water heating, solar air heating, solar cooking, etc. In the case of Wind the installed capacity in India by March 1997 was 898.55 MW with 3623 machines of which Tamil Nadu produces around 75%, Gujarat around 17% and Andhra Pradesh around 6%. The estimated potential is around 20,000 MW. The installed capacity of the world by 1996 is about 6100 MW. India has the third largest installed capacity after USA and Germany.

Introduction

Pollution (air, water, soil & food) is the hallmark of modernism. It is not only affecting the environment but also causing numerous problems to human, animal and plant life on the Earth. Power production is part of this game. Power is a vital input for nation's economic development. The state relies heavily on power for development in agriculture and industry. Though the country is generating around 100000 MW power yet there are power shortages all round. Consumption of electrical energy in India is only of the order of 340 kWh [which is less than even Pakistan] as against 8747 kWh of USA, i.e. around 3% of USA (**Table12**).

Table 12: Per capita availability and consumption of power

Country	Per capita	Consumption
USA	7819	8747
Singapore	8103	6770
Australia	5341	6606
France	4042	7126
Germany	4128	6513
Japan	3856	7281
UK	3772	5843
Brazil	0718	1783
China	0664	0719

Egypt	0600	0787
Mauritius	0387	0906
Pakistan	0254	0416
India	0248	0340

There are around 80.000 villages remaining to be electrified, of which about 18,000 are located in remote and difficult areas, which can not be electrified by conventional means. There are also concerns relating to environmental pollution caused by increased use of fossil fuels. The increasing demand primarily rel;ates to unabated population growth and their modern needs. With the growth of urban population by leaps and bounds their power needs exponentially increased. To increase the energy use by 9% per annum government is funneling 15 to 19% of plan funds. However, under the impact of globalization the government's spending in this sector has drastically come down. The urban population was 9.65% of the state population during 1901. This was raised to 27.08% by 2001. Under globalization, this may still go-up to touch the mark of 50% in no time as the main source of employment (agriculture) becoming uneconomical. In view of this, India like other developing countries has no option but to use all available sources of energy in an optimum manner, it is also necessary to keep in mind issues relating to sustainability of energy supply and consumption. All over the world, it is now recognized that energy efficiency and renewable energy are the twin paths to sustainable energy development. This is also true for India.

Sources of power production are categorized as conventional and non-conventional and renewable and non-renewable. Conventional energy sources are divided under three broad categories, namely (1) fossil fuels (known as Thermal Power), (2) fissionable nuclear fuels (known as Nuclear Power) and (3) non-fossil, non-nuclear energy sources – weather based (known as Hydel Power). There are several sources of non-conventional energy. They include the Earth based geothermal power, the weather based wind power & mini-hydel power, the Sun based photovoltaic power/thermal power, the Ocean based tidal power, sea waves power, Ocean thermal power, the waste based biogas/gobar gas, biomass power based on biomass, municipal solid waste & industrial waste.

Conventional Energy

Thermal Power

Fossil fuels are non-renewable and thus supply of many such fuels are approaching exhaustion. Also their continued use creating increased levels of atmospheric pollution, which is a major environmental hazard. Thermal power generation using coal, lignite, gas & oil as primary fuel emerged as the principal

source of electric power in India. The Thermal power as on 31st March 1999 was 66,665 MW. This constitutes around 74% of total power generated in India. In this the share of coal is around 84%. The first thermal power station of 1 MW capacity was installed at Calcutta in 1899. The unit size was 15 MW at the time of independence and this has steadily increased to 60 MW in 60s, 100 MW in 70s, 200 MW in late 70s & 500 MW in 80s. Today the size upto 720 MW has been proposed. With this the efficiency has increased from 29% to 64.7% in 1997-98. As on 1996 the coal reserves to a depth of 1200 m stood at 201.95 billion tons in an uneven distribution with 70% concentrated in the estern region of the country (**Table 13**). During 1997-98 coal fired thermal power stations consumed nearly 203 million tons of coal.

Table 13: Region-wise distribution of primary commercial energy sources

Region	Coal	Lignite	Crude oil	Natural Gas	Hydropower
Northern	1.1	1.1	-	4.0	225.00
Western	48.2	0.5	584.0	497.0	31.40
Southern	13.1	25.9	-	-	61.80
Eastern	141.4	-	-	-	42.50
Northeastern	0.9	-	148.0	159.0	239.30
Total	204.7	27.5	732.0	660.0	600.00

Note: Coal & Lignite are in billion tons; Crude oil in million tons; Natural gas in million cubic meters; Hydropower in TWh.

Nuclear Power

Fissionable nuclear fuels supply from relatively cheap sources drying up even for the most advanced countries. Moreover, the production and use of this source cause a plethora of hazards both to man and his balanced environment on the Earth. Russia's Chernobyl & Three-mile Island in USA tragedies are examples. This causes long lasting effects on living organisms and environment. Nuclear power is also conventional non-renewable. Uranium and Thorium are the two principal sources of Nuclear power generation stands at 1,800 MW (around 2% of the total conventional power). India's nuclear power development era started in October 1969 with the commencement of commercial operation of 2 x 220 MW power station (present capacity 2 x 160 MW) with boiling water reactor at Tarapore, Mumbai. Nuclear power stations are operating in addition in Rajasthan (RAPS), up (Narora), Gujarat (Kakrapar) and Tamil Nadu (Kalpakkam). At Kaig in Karnataka is under construction. The country has adequate Uranium resources to meet the lifetime requirement of

the first stage of nuclear power development programme of 10,000 MW. Apart from this, there are also large deposits of Thorium available in the country. The present estimates show that the known deposits may yield 3,63,000 tons of thorium oxide. Thorium resources, when used through breeder reactors, may produce 9,00,000 BkWh of electricity.

Hydro Power

The third one relates to non-fossil, non-nuclear energy sources. This is known as Hydro Pwer. Water (weather based) forms the source of energy production that depends upon the vagaries of the weather. It is free from environmental pollution. Water is a conventional and renewable energy source. The growth of Hydro Power generating capacity and its share in total conventional power generating capacity rose from 1950 level of 559 MW with 32.7% share to 21,910 MW with 24% share at the end of March 1999. There are about 55 Hydro stations in the country having capacity more than 100 MW. The highest unit size is 180 MW in Chamera in UP, followed by 165 MW in Daher and 132 MW in Bhakra. About 21 power stations totaling to 12,342 MW are under construction stage. The highest unit size is 250 MW both at Tehri (Stage I) in UP and Koyana (Stage II) in Maharashtra. Twelve hydro projects are in proposal stage.

In Andhra Pradesh APSEB/APGenco as on Feb. 1999 produced 5,610 MW of which 53% is thermal and 47% Hydel. Here private sector involvement is not discussed.

Conventional energy utilization in Andhra Pradesh

Table 14 presents the conventional energy production as on 31.3.199 in MW. And **Table 15** presents the conventional energy utilization in AP in MU.

The conventional energy handled in Andhra Pradesh increased from 6.915 MU in 1980-81 to 43, 722 MU in 1999-00, i.e. the increase is by 6.3 times. The increase in use during the same period under domestic category is by 10.0 times, under agriculture category it is by 11.2 times; under industry category it is by 2.1 times; other category it is by 5.8 times; under sales to other category it is by 6.3 times; and finally the energy losses category it is by 10.6 times. These figures under different categories appear to be unrealistic, particularly under agriculture, where the irrigated area increased by only a meager 2.45 times but the energy use increased by 11.2 times. This means to irrigate one lakh hectare 117.76 MU was consumed during 1980-81 raised to 538.00 MU during 1999-00 (4.457 times). In the case of irrigation category the use must be linear to area cultivated plus related to the depletion of groundwater with time. The use of submergible pumps improved power use efficiency over surface pumps. Also even if we assume 100% illegal pumps, still it is too high. While in the case of domestic, industrial sector the electronic gadgets use as well as the population

growth & industry growth and urban growth present a non-linear increase plus the illegal use is rampant. Therefore, it appears that the estimates of domestic & industry are under the scale while the estimates under the agriculture are above the scale. The game is to under play the energy losses – T & D losses + illegal use [which are really around 50%]. With the globalization (motive is to privatize and to introduce corruption at all levels by placating employees) the power sector reforms were introduced under the World Bank dictas cause the incurring of huge losses, though the efficiency of production increased, hither to under erstwhile APSEB running under profits. The whole exercise of power sector reforms is to hand over the sector to private parties for a price.

Table 14: Conventional energy production as on 31.3.1999

Category	Power Production			
	India		AP#	
	MW	%	MW	%
Thermal	66,665	74*	2,953	53
Hydro	21,910	24	2657	47
Nuclear	01,840	02	-	-
Total	90,415		5,610	

* coal alone contributes to 84%; # = APGenco production as on Feb. 1999

Table 15: Conventional energy utilization in AP

Category	Year by year energy use in MU (% to energy handled)				
	1980-81	1990-91	19995-96	1998-99	1999-00
Energy Handled	6,915	20,233	29,457	38,720	43,722
Domestic	0546	2,079	3,276	5,090	5,486
	(7.90)	(10.28)	(11.12)	(13.15)	(12.55)
Agriculture	915	6285	11399	9554	10222
	(13.23)	(31.06)	(38.70)	(24.67)	(23.38)
Industry	2966	5715	6010	5786	6171
	(42.89)	(28.25)	(20.40)	(14.94)	(14.11)
Others	677	2,014	2,715	2,817	3,924
Sales to others	287	161	505	759	1801
Energy losses	1524	3979	5527	14714	16118
	(22.03)	(19.67)	(18.85)	(38.00)	(36.86)

Non-conventional Energy

The development in the non-conventional energy sector was accelerated after the formation of Department of Non-conventional Energy Sources and later renamed as Ministry of Non-conventional Energy Sources [MNES], Government of India, which offers policy and financial assistance to projects based on renewable energy sources in the country. Non-conventional Energy Development Coprporation of AP Ltd. [NEDCAP] is the nodal agency for implementing the renewable energy programmes in thestate sponsored by the MNES and the state government. It is implementing national project on biogas development, solar energy programme, wind energy programme, biomass based power generation, biomass gasifiers, co-generation projects, small hydro projects, power generation through industrial waste. **Tables 16 & 17** shows the power production through renewable energy sources in India & world over and in AP.

Table 16: Power through renewable energy sources

Source	India		World
	Potential	Exploited	Production
Wind	40,000	1,000	17,000
Mini-Hydel	10,000	25	21,000
Biomass	17,000	69.5	11,000
Tidal waves	9,000		
Ocean Thermal	50,000		
Sea waves	20,000		
Solar energy	5×10^{15} Whr/25 Year		1,000

Table 17: Power through renewable energy sources in AP as on 31.3.2002

Source	Renewable energy, MW			
	Potential	Sanctioned	Capacity Harnessed	Balance potential
Wind	745	166.04	92.54	536.42
Biomass	627	361.00	89.55	176.45
Bagasse*	250	228.50	78.50	55.00
Municipal Solid waste	40	27.00		13.00

Industrial waste				
Poultry	65	12.00		56.00
Distelleries	30	1.00	1.00	29.00
Others	40	19.42	72.10	318.10
Mini Hydel	500	109.80	72.10	318.10
Total	2297	924.76	334.19	1204.05

* 10th five-year plan projections

Wind Power

Wind energy has been used for thousands of years to propel sailing ships and for pumping water and grinding grain. Since mid 70s the development of wind energy technology has made significant progress. The world's total wind turbine capacity has reached 8,500 MW in 1998. A total capacity of 1700 MW has been set up particularly in the USA in the state of California. The present installed wind power capacity in Europe is about 5,500 MW and in Germany it has reached upto 2400 MW. A capacity of 1300 MW has been installed in Denmark and about 350 MW in Netherlands. The wind programme in India was initiated in the year 1983-84. It is estimated that a gross potential of 40,000 MW and a technical potential of about 8946 MW exists in the country. So far projects aggregating to 992 MW have been set up in different parts of the country.

Table 18: Variation of wind speed with seasons and places

Month	Wind Speed in kmph							
	1	2	3	4	5	6	7	8*
January	1.4	6.7	8.9	13.5	3.2	10.3	9.8	5.0
February	1.8	9.3	10.0	14.8	3.3	10.7	9.3	5.7
March	2.5	11.8	13.3	16.1	4.2	12.0	10.7	6.9
April	2.7	11.9	17.2	16.7	3.9	14.7	12.5	7.9
May	2.4	11.7	26.1	20.0	4.2	23.0	15.5	8.4
June	1.9	11.9	29.6	23.5	10.0	32.6	17.6	9.0
July	1.9	11.5	29.1	27.1	10.9	31.0	16.2	7.2
August	1.8	8.5	23.4	21.9	8.9	30.8	15.3	6.3
September	1.6	7.0	16.8	15.0	6.5	26.2	11.1	5.0
October	1.4	6.1	8.7	11.8	3.4	16.3	9.0	4.4
November	1.5	5.3	6.7	12.4	3.0	9.5	10.2	4.3
December	1.2	5.4	6.8	12.3	5.2	10.1	9.4	3.4
Annual	1.8	8.9	16.3	17.1	5.4	18.9	12.2	6.1

* 1 = Silchar, 2 = Chirapunji, 3 = Dohad, 4 = Dwaraka, 5 = Ootacamund, 6 = Coimbatore, 7 = Gannavaram, 8 = Ramagundam.

Unlike solar energy, the wind energy is highly location and season specific. **Table 18** presents variation of wind speed in kmph at monthly interval at few selected locations in the country. Power in the wind is proportional to cube of wind speed/velocity, which means that doubling of wind speed increases power by eight times. The annual mean wind speed at a site should be at least 18 kmph (preferably about 20 kmph) for economic harnessing of wind power. The data presented in Table 3 indicate that only one of the 8 stations (coimbatore in Tamil Nadu) is suitable for commercial exploitation of wind power. Closer to this are Dwaraka and Dohad in Gujarat. In line with this data, the installed capacity in India by March 1997 was 898.55 MW with 3623 machines of which Tamil Nadu produces around 75% (with around 2534 machines), Gujarat around 17% (with around 727 machines) and Andhra Pradesh around 6% (with around 209 machines). India has the third largest installed capacity after USA and Germany. It is said that the capital cost is comparable with that of a thermal station and generation. In addition, generation from wind is pollution free and saves on the scarce natural resources such as coal and gas.

In the state of AP the areas around Anantapur, Kadapa, Kurnool and parts of Nellore and Chittoor districts have relatively better potential sites to set up wind power projects – potential is about 850 MW. NEDCAP had established 0.55 MW demonstration project at Tirumala in Chittoor district with the support of MNES and TTD, which was later expanded to 1.05 MW by putting two numbers of 250 KW machines. Further a 2 MW demonstration project was set up by APSEB at Ratnagiri in Anantapur district. This project was also funded by MNES under demonstration category. NEDCAP is the single window clearance agency to sanction projects upto 20 MW and so far 92.5 MW wind power projects were set up by 24 developers at Ramgiri and 5 MW projects at Tallimadugula in Anantapur district and 2.5 MW in Kurnool district. Based on wind mapping it is estimated that the gross potential of 2200 MW and technical potential of 1230 MW can be exploited in AP. The wind power may not be viable with exorbitantly increased wheeling charges by APGenco from 2% to 28.4% + 0.50% per km as network charges. The approximate land required for setting up of 1 MW wind farm projects in complex terrain would be around 20 acres. Based on the present cost of machines the capital cost for installation of 1 MW project would be around Rs. 350 to 500 lakhs. At government of India level, loan facilities are being provided through Indian Renewable Energy Development Agency (IREDA). It provided loans up to 75% of the project cost. The interest rate applicable at present is 13-15%. At state level, the wind projects

will be eligible for capital subsidy to the extent of 20% of the project cost subject to a ceiling of Rs. 25 lakhs.

Solar Power

The Sun emits energy known as "Solar Radiation". Its intensity varies with latitude, season and time of the day. Based on the atmospheric state this energy is reduced by the time it reaches the Earth's surface. Solar energy is abundantly available in India, being a tropical country. **Table 19** presents the range of availability of solar radiation (Rt in ly/day) over India during different periods and in different regions. In India, except over the Northeast India, and in December month, the average solar energy is more than 300 ly/day – it varies from 4 kWh/day to 7 kWh/day. Solar energy is used under two different technologies, namely Solar Photovoltaic (SPV) Technology and Solar Thermal Power (STE) Technology. That is, solar energy can be transferred into electric and heat energy using appropriate technologies and equipment.

Solar Photovoltaic (SPV) technology: In the case of electric energy, Photovoltaics are used. Photovoltaic refers to the direct conversion of sunlight/solar radiation into electricity. The conversion is made possible through the use of Photovoltaic cells made of silicon or other semi-conducting materials. Silicon is found in common sand. Each chemically treated silicon of different layers act as negative and positive charges and these cells are joined and covered by weather proof solar panel that can be mounted on an elevated place without any obstructing objects in the way of sunlight. As sunlight is absorbed into the PV cells, a flow of electrons is created which produces direct current (DC). The batteries are sized to store electricity for 2 to 3 days of cloudy weather. The solar panels tend to last 20 to 25 years and the cost of the panel is around Rs. 205 per watt – for wider adaptation the cost must be brought down. A 17-watt system can power 3 lights for 3 hours a day, or one light for 9 hours. The cost of this system is around Rs. 10,000. A 35-watt system can power 4 lights for 4 hours and a B&W TV for 3 to 4 hours. The cost of this system is around Rs. 15,600. The deep discharge batteries are used for solar systems and thus their lifetime (around 4 to 5 years) is greater than an ordinary automobile battery. A 17-watt system 40 AH battery costs around Rs. 2,500 while a 35-watt system battery of 90 AH costs Rs. 3,500.

Table 19: Solar radiation (Rt) range over India during different periods and regions

Period/season	Rt (ly/day)	Period/season	Rt (ly/day)
January	300-500	February	300-550

March	350-600	April	350-650
May	350-700	June	350-650
July	350-600	August	350-550
September	350-550	October	350-550
November	300-450	December	250-450
Winter	300-500	Summer	350-700
Monsoon	350-500	Annual	350-550
East Coast	400-600	West Coast	350-666
Peninsular India	400-700	Northwest India	400-700
Central parts	350-700	Northeast India	250-450
Jammu & Kashmir	300-650		

The solar radiation received over the Indian land area is estimated to be around 5,000 trillion kWh/year. However, it is not practically feasible to tap the solar radiation falling over the entire land area. With the present status of photovoltaic technology it is feasible to set up a 25-30 MW capacity PV power plant over a land area of one square kilometer assuming a net PV system conversion efficiency of 2-3%. So far a cumulative total of 50 MW of PV systems, numbering around 8,50,000 have been deployed in the country.

Solar Thermal Energy (STE) technology: Solar water heating, solar air heating, solar cookers come under this technology. It is an effective technology to reduce green house gases emissions. In the state of AP around 14,200 box type family size solar cookers and 50 concentrated type solar cookers were sold. World's largest steam cooking system with a capacity of cooking 15,000 meals at a time is being installed at Tirumala for TTD. The same with 500 meals is being installed at Rishi Valley School in Chittoor district. Six community cookers for cooking around 40 people are being installed in Karimnagar district. Sold 30,132 SPV lanterns, 1013 SPV home lighting systems, 935 SPV street lighting systems, 9.70 kW SPV mini power plants were established at Buggathanda, Nalgonda district;, Fargulathanda, RR district; and EPTRI, Hyderabad; Ashram school, Kadapa. Seventy SPV pump sets, 5 SPV power TV systems, etc are also commissioned. The private companies are more active in this area. The statistics are not included here.

Mini Hydel

Mini hydel projects are those with capacity less than 25 MW. Government of AP transferred this activity from APTransco to NEDCAP since 1.2.1999. This programme can be divided into two groups, namely private sector and public sector. Under the private sector programme the identified potential is 500 MW by 2007. A capacity of 109.80 MW projects have been sanctioned, out of this 74.5 MW from 27 projects have been commissioned and 25 MW is under

progress. Under public sector the production is 78.0 MW from 12 units and 4.15 MW capacity is under construction.

AP stands in 3rd place both in terms of power production and number of projects. In terms of number of projects the 1st, 2nd, 4th & 5th places are occupied by Uttaranchal, Arunachal Pradesh, Himachal Pradesh & Karnataka and while in the power production, they are Maharashtra, Karnataka, Punjab and J&K (see **Table 20**). During the 10th five-year plan the central government is planned to develop 540 MW with 195 projects. AP share in this is 29.80 MW with 13 projects. So far the production capacity in 20 states is 1,461 MW under 438 projects. AP share in this is 150.90 MW under 47 projects.

Table 20: Mini Hydel projects/production

State	Current Prod. (MW)	Proj.	Planned* Prod. (MW)	Proj.
All-India	1461	438	540	195
AP	150.9	47	29.80	13
Karnataka	156.9	30	69.33	17
Tamil Nadu	73.90	10	10.40	3
Kerala	69.25	9	75.50	11
Maharashtra	206.33	26	16.50	5
HP	93.24	41	33.00	10
J&K	102.24	27	13.31	9
Punjab	103.20	17	7.90	5
Uttanchal	61.75	67	35.00	22
Arunachal Pradesh	32.37	50	51.64	27

Biogas

This is a national project. The plant waste, domestic waste, animal dung, etc. made gasification (through the process of elimination of contact with oxygen) produces carbon dioxide and methane gas. The methane gas has a property of burning. This is known as biogas if the material used is biomass and gobargas if the material used is cattle dung. The compost generated in this process could be used as manure for crops. India being an agricultural country and by combining animal husbandry with agriculture, this source becomes a major source of energy in rural India. Biogas is a clean, unpolluted, low cost fuel and is a renewable source of energy. In rural India 68% energy is required in the domestic sector of which 64% is for cooking and 4% for lighting. The main source of energy in this sector has been fuel wood (68.5%) and cattle dung (8.3%).

The annual cattle dung production in the country was estimated to be 1.30 million tons and its collection rate is 66%. The biogas generation from this dung is 85 million meter cube per day. This can be meet the domestic fuel requirement of about 225 million people in addition to light and enriched manure.

In the state of AP since 1982, sofar 2.67 lakh numbers of biogas plants (deenabandhu model of 1 cum/ 2 cum capacity) covering 22 districts are installed till the end of 2001-02 against estimated potential of 10 lakh biogas plants. This is a government of India scheme with subsidy of Rs. 1800/- for small & marginal families, ST/SC for whom the subsidy is Rs. 2300/- — of the cost of Rs. 5400/- per unit. These are individual family units, where the family puts the required dung and uses the compost as manure. The life of the unit is expected to be 20 years. In the past these were installed at community level but failed due to "management".

Municipal Solid Waste

The concentrated economic growth around urban areas has created uncontrollable solid waste. The management of solid waste consisting of industrial hazardous waste, bio-medical waste and domestic solid waste (generally known as municipal garbage) involves collection, transportation and safe disposal or utilization. It is estimated that the total solid waste generated by 300 million people living in urban India is about 38 million tons per year. About 1,00,000 metric tons of municipal solid waste is generated daily in the country. That is per capita waste generated in major cities ranges from 0.20 kilos to 0.60 kilos. Garbage generated per day in metric tons in some selected cities in AP are Hyderabad – 2200, Visakhapatnam – 600, Vijayawada – 500, Guntur – 350, and Warangal – 250 MW. In the state of AP a potential of 40 MW of power generation from these sources have been identified. Projects with a capacity of 23.60 MW have been questioned. This is not a pollution free process.

Biomass

Under biomass, there are two types, namely biomass power generation and co-generation (bagasse-based) projects. In the case of biomass power generation, the government of India has provided incentives (interest subsidy) for generation of power through biomass. The government of India has provided a maximum capitalized upfront subsidy of Rs. 451 lakhs/MW on field based biomass or Rs. 30 lakhs per MW as captive biomass. In the state of AP till date a capacity of 374.05 MW has been sanctioned out of which 96.25 MW has been commissioned from 19 projects through agriculture waste. A capacity of 277.80 MW projects are under execution. Under co-generation, as on date 228.50 MW has been sanctioned out of which 78.50 MW capacity has been commissioned and 150.00 MW capacity projects are under execution.

Industrial Waste

A potential capacity of 65 MW has been identified in the state. Projects with a capacity of 12 MW projects have been sanctioned and out of this 1.50 MW have been commissioned. This is not a pollution free process.

Summary

Although a large number of renewable energy devices have been developed in the country and are being commercially manufactured, it can not be denied that there is a lot of room still for improvement of the devices and the development and introduction of newer technologies. Solar energy systems play an important role in both urban and rural India in near future. More research efforts are required to bring down the cost of the solar panels. Though the wind energy potential is substantial it may not be viable for private participation in near future due to high wheeling charges. Unlike many renewable energy sources, biomass power production causes environmental pollution. Gobar gas is the most viable mode of replacing fire-wood in rural India.

The power reforms undertaken under the World Bank manipulation by the AP government, causing huge losses to electricity department due to corruption, inefficiency, placating employees, private interests – finally all these leading to motivated to privatize APTransco.

Appendix –V: October 2009 flood tragedy in AP: observations

From: jeevananda reddy <jeevananda_reddy@ yahoo.com>
Subject: October 2009 flood tragedy in AP: Observations
To: "Dr. Manmohan Singh Prime Minister of India" <manmohan@sansad.nic.in>,
"Smt. Sonia Gandhi NAC" <soniagandhi@ sansad.nic. in>
Cc: "chief secretary" <cs@ap.gov.in>
Date: Thursday, October 8, 2009, 11:03 AM

To: Hon'ble Prime Minister of India
& Chairperson of NAC
New Delhi

cc: Chief Secretary, GoAP

October 2009 flood tragedy in AP: observations

General:

There are 37 minor and major rivers in Andhra Pradesh. These include Godavari, Krishna and Penna and their tributaries. Sir Arthur Cotton constructed a dam across the River Godavari near Dawaleswaram in 1847-52 and on the river Krishna at Vijayawada in 1852-55. After Independence, Congress governments with the Dr. Neelam Sanjeeva Reddy heading the state helped to utilize water in the major rivers for both irrigation and power production through construction of major dams. On the River Krishna the two major dams constructed were Srisailam and Nagarajunasagar, providing irrigation water, drinking water and power production. The first Prime Minister of India, Late Pundit Jawaharlal Nehru has Considered Dams as modern temples and helped states to take up such projects.

Godavari water being at very low level compared to irrigated land, no government tried to utilize this water for irrigation. Here water is available for irrigation through lift irrigation and that require power. Though Late P. V. Narasimha Rao was from this region, even after becoming the Prime Minister of India did little to solve this problem.

In the case of Krishna, the tribunal allotted 811 TMC of water to Andhra Pradesh – one unit to Rayalaseema, around two units to Telangana & around three

units to Coastal Andhra + drinking water to Chennai, Hyderabad, etc. Here the actual inflows to the dams from Kurnool district that includes Nallamala forest were not properly assessed and thus allocated low water share to Rayalaseema region. This is clearly evident from the flows during the last three years to Srisailam dam.

However, the tribunal order says Andhra Pradesh has the right to use the surplus water in which drought prone Rayalaseema gets first priority and second priority to dry southern parts of Telangana & Coastal Andhra. Though the state was given to use surplus water, no attempt was made to utilize this part of the water except laying foundation stones without creating provisions to take the water from the dams. After Dr. YSR take over as CM of the state under Jalayagnam, taken up the task of taking out the water with respect to three regions of the state. He took up the projects in all the three regions under balancing act as per tribunal order. However, people using the surplus water illegally for the past 20 years did not like this!!!

Issue of Srisailam Dam:

Dead storage level is 830 ft and later this was lifted to 834 ft – during TDP regime water below these levels was also used for power generation. By using that water creates problem in the subsequent year that require more water to fill the cracks in the soil in the tank bed (In agriculture sector, more than 60% of power is consumed in Telangana region for lift irrigation that includes wells/bore wells. As the Hydro power was cheap over thermal power, the government could provide power to agriculture sector for irrigation needs.);

Pothireddypadu head regulator to extract 11, 000 Cusecs in 45 days (34 TMC – Teluguganga project – for drinking water to Chennai, etc & irrigation water to Rayalaseema) at a level 841 ft was constructed. New Pothireddypadu head regulator to extract 44,000 Cusecs in 30 days (as the Almatti dam height was raised, the 45 flood days was reduced to 30 flood days) (34 TMC of old + 86 TMC from surplus flow = 120 TMC) at a level 854 planned to construct – this is still under construction. A GO was issued to maintain the water level above this level. This was the outcome of all party meeting organized by late Dr. YSR;

I wrote an article in Vaartha a daily news paper as back as 5-3-2007 after a round table meeting held in the Institute of Engineers in which prominent irrigation engineers from Telangana were also participated and a booklet was circulated for discussion. This meeting was held based on my comments on an article published in Eenadu daily newspaper (the daily paper did not publish my comments but sent it to the writer of the article) – the writer's comments on my comments included in the booklet circulated – but they failed to invite me for the meeting but I went on my own;

Full level is 885 ft (263.6 TMC, silting may reduce this)– it can go up to free board of 892 to 896 ft and after this flood water overflows from the dam (it is a concrete dam).

The actual situation:

From the outflow of Srisailam dam, as per the tribunal order 480-34 = 445.2 TMC of water is permitted to use for irrigation & drinking (Hyderabad, etc);

If we look into the water stored in the Srisailam dam, Nagarjunasagar Dam & Krishna Barrage at Vijayawada data during 2008-09 water-years, it is clear that more than 200 TMC of water was illegally used in excess over the allocated water. If this water would have been retained in the Nagarjunasagar Reservoir, 2009 Kari would have been successfully completed under the drought conditions – may be because of this Srisailam water is kept at full capacity to avoid illegal pilferage of water from Nagarjunasagar dam;

No body talks on this type of illegal use of water for the last twenty years on an average more than 200 TMC (in addition to on an average around 600 TMC of water entering into the sea). This information was presented in the booklet circulated at the above mentioned round table meeting;

This issue I raised at the Z - 24 hour TV panel discussion programme held on 6th October 2009 from 13.00 to 14.00 PM – in the panel at the TV channel studio: myself, V. Prakash founder member of TRS (major tink tank of TRS) and a retired irrigation chief engineer along with on phone: Vidyasagar Rao (former CWC member) a prominent TRS member & T.G. Venkatesh (Congress MLA from Kurnool);

Mr. Prakash himself has written an article few years back in Martha daily newspaper (I showed this to viewers of TV channel) in which he showed the excess water use statistics during 1999-2000 water-year that support data given in the booklet mentioned above. The fact is that the surplus water as per the tribunal order Rayalaseema gets top priority and next by dry south Telangana and dry south costal Andhra but not the northern zones, who at present using more than 200 TMC illegally.

This year's devastation:

Media, people & groups that are anti-Dr. YSR regime with the vested interests started campaigning canards against late Dr. YSR saying that he is responsible for this year's disaster and the government should have released the water to Nagarjunasagar Dam as it is still capacity to absorb 100 TMC and Dr. YSR wants take water to Rayalaseema so he issued a GO not to release water until it is full;

The Engineer-in-chief in his media meet said all most all the projects from Almatti onwards retains the water in full until there is sure inflows into the dams and accordingly the water in the Srisailam Dam was retained as drought conditions were prevailing in the state but power was generated at full capacity and the out flow water entering Nagarjunasagar Dam – on 30th September, dams starting from Almatti were full;

On September 30th 2009 the water in Srisailam Dam was at around 884.4 ft. Even though IMD forecasted widespread & heavy rainfall and CWC informed the heavy inflows in the upstream areas as well dams expected outflows were high, Rosaiah the CM was busy in lobbying support with ministerial births promises and other things and not bothered to monitor the flood conditions with the officials on

the 1st October 2009. Even on 2nd October 2009 morning, Rosaiah was busy with inaugurations, functions when Kurnool & Kurnool district and Mahboobnagar were under submergence. Under one such situation Dr. YSR cut short his foreign pilgrimage and continuously monitored the situation;

If Rosaiah would have monitored these since 30th September onwards and taken the decision timely, that is starting release of water on 1st October morning itself to bringing down water level to 875 to 880, the back water affect to Nandyala and Mahboobnagar would have been averted. By this way he has given an opportunity to vested groups to make false anti Dr. YSR propaganda;

Rosaiah started media brief only after the electronic media attacked Rosaiah in live monitoring programme for his in action in time – I myself was with I-News Channel from 9.30 am to 13.00 pm; Z-24 hours TV channel from 14.00 to 18.30 pm & ABN Andhra Jyoti (NBC Andhra Jyoti TV Channel) from 19.00 to 20.00 pm;

The Kurnool fiasco was due to Revenue departments in action. In fact after the last two years floods in Kurnool, it was told associated with poor town planning as buildings have come up in rivers and low lying water drains. Even when I suggested take out people to towards Nandyala Road as elevated areas are located. No body bothered. In fact VHP did this. Pity is, that the state government did not bother to come to the rescue of the marooned people until the water was receded from the town though ministers/MLAs were crying for help;

I my self warned that back flows will affect Mahboobnagar and needs shifting of people from low lying villages and back water will not affect Kurnool town. This has come to be correct prediction. I also suggested taking initiative to shift the people along the Krishna River to avoid flood water but no action was initiated by the government. I also mentioned that start evacuating people in the outflow of Krishna barrage (if they refuse use force) as the mechanism exists in this part of the zone. The government's orders came very late though ministers were hectic in shifting them;

Vested groups argued that the cause of devastation is due to Pothireddypadu, I asked the panel members as well Vidyasagar Rao, when the new Pothireddypadu project is still under construction, your saying that the water in the Srisailam Dam was kept at higher level because to take water to Rayalaseema. They did not responded on this even after the moderator repeatedly asked them. That means it is only a propaganda unleashed by anti-Dr.YSR media and people/groups. ———

Summary & Conclusions

The opposition leader, Chandrababu Naidu was busy with going round the flood affected areas and meeting in person the affected people and encouraging party cadre to lend helping hand to the needy affected people and collecting funds & material to provide his share of relief but Rosaiah at the same time was busy in meeting the lobbyists to strengthen his position as CM, changing office, changing cars, changing bureaucrats, planning to change ministers, etc. that shows how inefficient administrator is Rosaiah? Rosaiah was more interested to keep his position in tact and casual at the flood disaster. Without Minister Dharmana Prasada Rao's

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Koramangala

intervention the disaster would have been aggravated further as Rosaiah lacks the administrative capability in such eventualities:

The timely action from Rosaiah & his team would have reduced the flood disaster and saved the lives of few. The calamity is, thus, is mainly due to his inaction only;

Every body must appreciate the solid & commendable work from the start to end by electronic media. Without this support the disaster would have been very severe. However, some media, persons & organizations took up vested campaign against late Dr. YSR to strengthen the position of Rosaiah at High Command. However, the people doing the campaign for Rosaiah did not consider the flood calamity an important issue;

The CWC must take into account all the water flows based on rainfall, in their future assessments in light of the climate cycle and increasing rainfall trend;

Each district must collect the rainfall & flood information through the revenue official network during monsoon seasons;

Irrigation officials must attend maintenance aspects before the start of rainy season at all the dams;

We must appreciate local Ministers, more particularly D. K. Aruna for her bold entry in the flood affected areas even without the support from Rosaiah — Even MLAs & Ministers were unable to get support to meet the rehabilitation measures;

In the case of people down stream of Srisailam, the past governments must have shifted the villages in the severe flood prone zone. In fact some of them constructed houses illegally on river bed as well some put holes to Karakattas built during British rule and thus weakened them that helped breaching and flooding the low lying areas. There is a need to re-locate such people on permanent basis and remove all the holes made to Karakatta and strengthen them – in fact I made these while seeing the situation live at TV channel;

Finally an appeal: From the events that are traveling from Delhi to Hyderabad and some media and people/groups attack on Dr. YSR after his death, I have some suspicion on the death of Dr. YSR itself: Whether it is an accidental accident or pre-planned accident? I am raising this, basically because the Helicopters do not fly into such severe weather. This is clear from the Helicopters refusing to fly in the flood rescue operations even though the weather is not such severe!!!

Thanks

Dr. S. Jeevananda Reddy

Note: Recent floods in A.P. — Man Made Disaster!!!

From:

"jeevananda reddy" <jeevananda_reddy@yahoo.com>
Add sender to Contacts

To:

"waterwatch yahoogroups" waterwatch@yahoogroups.com

Namaskar,
Please find forwarded message — another yahoogroup saw my mail letter to PM (presented in Appendix – V) in the present group and asked me to reply fourteen questions. Forwarded message includes questions & my answers.

Thanks
Dr. S. Jeevananda Reddy
— On **Sun, 10/18/09, jeevananda reddy <*jeevananda_reddy@ yahoo.com*>** wrote:

From: jeevananda reddy <jeevananda_reddy@ yahoo.com>

Subject: Re: [tdf-charcha] Fw: [WaterWatch] Fw: Recent floods in A.P — Man Made Disaster !!!

To: tdf-charcha@ yahoogroups. com

Date: Sunday, October 18, 2009, 7:34 AM

Namaskar,

Thanks for the mail.

Please find my answers to your questions.

Statement A: As per your statement "Before sending a biased report to P.M & Sonia on recent 'Man Made Disaster' why don't you take the advice of irrigation engineers/ experts as you are not an engineer yourself".

Answer: I am a post-graduate in Earth [— my M.Sc. (Tech.) Thesis topic relates to Hydrology — my professor's first Ph.D. student was OU, Geophysics Dept. first Head] & Atmospheric Sciences – Meteorology & Oceanography – [Hydrometeorology that works out flood forecasts was part of IMD in which I worked but later made

separate Department, as Hydrometeorology] as well in applied statistics and Ph.D. in Agricultural Meteorology. Last month IMS (I am a local chapter committee member) organized a workshop on flood forecasting & management jointly with State Remote Sensing Department/agency. IMS, CWC and IMD members along with flood management engineers participated in this workshop. MSR was the chief gust. In the past MSR organized several meetings on urban flooding. I was one of the invitee, in which I submitted a report also on issues of urban flooding in general and twin cities in specific. I think this answers your statement that I am more or equally qualified in making statements on floods & droughts.

Statement B: Please answer me the simple questions on recent floods & Srisailam dam levels, power generation aspects etc. I am asking you the following questions as a Telanganite & will appreciate your replies. I am also giving an expert's **[K.P.Reddy — Ret'd S.E, A.P.Genco, who worked on Srisailam Project for over 3 decades] opinion on the recent havoc as a rejoinder to your biased mails to Waterwatch group on the recent floods & it is available after my questions.**

Answers — question by question:

Question 1: Why Srisailam Project originally designed as a power project was converted to Multi-purpose project?

Answer: It is very simple, to facilitate use of surplus water rights given to Andhra Pradesh and more particularly to Rayalaseema and drier parts of south Telangana & south Coastal Andhra. However, it is & it will be still a power project.

During NTR time, Pothireddypadu with 11,000 cusecs [34 TMC of water] was constructed at 841 ft in around 1984 to provide drinking water to Chennai, etc under tribunal award and to meet the irrigation needs of Rayalaseema as per the allotted water – the dead storage level was shifted from 830 ft to 834 ft with reference to World Bank funds instead of 841 ft. From NTR regime to last TDP regime, foundation stones were laid to use surplus water but no provisions were made to extract that supply from Srisailam Dam, even at the time of constructing Pothireddypadu – as major share of money was paid by Tamil Nadu government. Those people ruled that time must answer for the lapses. What was the politics in that!!! — was part of TDP and he watched Karnataka raising the height of Almatti dam.

After Dr. YSR take over as CM, he initiated projects to extract surplus water part from Srisailam Dam, etc to utilize the surplus water allotted to the three regions (see Sakshi edit page article, 17th October 2009). Under this, Pothireddypadu project was one component. Original Pothireddypadu was modified to take 44,000 cusecs in 30 days instead of 45 days as Almatti Dam's height was raised – they also started constructing projects to utilize surplus water, though they have no right. Dr. YSR put the issue before the all party meet and decided to construct Pothireddypadu at

a height 854 ft instead of the original 841 ft to avoid misuse of water at 841 ft. Still it is under construction. This has nothing to do with this year's floods as stated by TRS including Vidyasagar Rao of TRS – I questioned him through two TV channel live telecast programmes but he did not respond to this. This year, the minister announced to release water for Rabi crop under Nagarjunasagar on 15th October as well release of water to Chennai, etc.

Question 2: G.O - 69 of A.P. Govt. clearly specified the priorities of water distribution from Srisailam —like, 1st priority power generation, next water to Hyderabad city, next water to Madras, next water to Nagarjunasagar ayacut. Why they were not followed?

Answer: This is not correct; if you look at the data (records at Srisailam Dam) your observation is totally false – such statements serve to raise separatist sentiments only. You people are always interested on false propaganda. Even K. P. Reddy says that "Srisailam dam is for storing water as backup reservoir and release water by generating maximum power". Let me give one simple example: You have circulated a mail from P. K. Krishna Murthy, Girivajra Chits (P) Ltd story on illegal earnings of Dr. YSR family. In this one point relates to "Ramky gets cheap land" – Ramky got favours from the government in various forms. Given land allocations in Visakha Pharma City —, the land to Pharma City & lands to Shamshabad International airport were allotted by TDP government and not by Dr. YSR government. We filed PILs on these two on their improper site selection for such projects. Same is the case with Jedcherla SEZ.

For power production, water was used even below the original dead storage 830 ft on many years – up to 817 ft or even less (irrigation minister has given this information to media at his press meet). I wrote several newspaper articles on such usage of water below the dead storage level for producing power and selling it to others; as in the subsequent years require more water to fill the cracks in the tank bed soil. This year with drought conditions and thermal power tripping, the Hydro power saved the government. At the same press meet he also presented facts on water levels maintained in Srisailam dam during the last 25 years, saying that in 19 out of 25 years the levels were maintained between 880 and 885 ft. He also gave statistics, saying that it is not new to keep water above 880 ft in Srisailam dam even when the Nagarjunasagar was empty.

To Hyderabad water, Musi is the tributary of Krishna River but very little water from Musi enters Krishna River. Himayatsagar & Osmansagar Reservoirs were built as back as 1913-27 on this river and it's tributary to meet the drinking water needs of 12.5 lakh people (in 1961) and irrigation needs through groundwater. The cost of supplying this water was minimal. However, vested groups started destroying these two reservoirs in terms of water quantity & quality flowing into the two reservoirs. But, no body bothered except few environmental groups. I filed PIL in high court, which is still pending. Around 70% of the water distributed by metro

water board & extracted from ground water in twin cities is going as sewage (now it is around 1500 MLD) is used for irrigation in down stream of Musi. This way, more than 30 TMC of water is used for irrigation in the down stream of Musi. Around 180 MGD is extracted from Krishna River (Nagarjunasagar Reservoir) in two phases. In fact, Telangana leaders proposed to use Godavari water to meet the growing demands for drinking water & industrial needs of twin cities and their surroundings with more or less merged with four neighbouring districts as well other districts migrating to twin cities – in 1901 the population was around 4 lakhs now it is more than 80 lakhs and may double in next decade time.

With reference to supply of water to irrigation under Nagarjunasagar ayacut, in the last 20 to 25 years on an average more than the allocated water was used from the Nagarjunasagar dam and down below. That means the water from the sagar reservoir & down below is illegally used — surplus water on an average entered into the Sea was around 600 TMC. If we add to this, the illegally used after Srisailam dam it could be around 800 TMC – around 50% of this is allocated for use by AP, more than 50% of which to Rayalaseema and the remaining to other two regions southern drier parts and not to wetter parts of the northern parts of the two regions, which are using for this for the last 20 to 25 years. I questioned Vidyasagar Rao of TRS on the illegal use of surplus water when he raised the issue "When Nagarjunasagar was empty, why keep water in Srisailam full" through two TV channel live telecast programmes but he did not respond to them. However, V. Prakash (founder member of TRS) sitting with me on TV Channel panel responded saying how this water was taken out — after I showed the viewers an article written by him in Martha daily the excess water use with facts and figures during 1999-2000 irrigation-year. The other panel member, a retired Chief Engineer informed the audience, the surplus water allocated to Rayalaseema was more than 200 TMC. All these suggest that if Rayalaseema & other two regions use this surplus water, there is no way they can use the excess water hitherto were enjoying for the last 20 to 25 years. Because of this, TRS leader did not opposed rising of Almatti height by Karnataka!!!

Question 3: Srisailam water levels raised from 834' to 854' by YS govt by G.O-107 in 2004 after he became C.M to divert water to Pothireddypadu to irrigate Kadapa dist. lands as well as water supply to Brahmani steels & Raghuram Cements of YSR family & Friends. Was it not true?

Answer: How the allocated water is used rests with the Rayalaseema people and leaders as per the orders stipulated in the Pothireddypadu order. We have got several projects in other two regions for which government is providing water. Why not to others who started projects in Rayalaseema? You do not like projects coming up in Rayalaseema – I am one of the committee members fought for Vijag steel plant. Collect charges as per law. When Jyotibasu was CM, people questioned about his son establishing industries. He simply said, just because I am CM my son can not start his own company? The same reply was also given by late Prime Minister Indira

Gandhi, when Sanjay Gandhi wanted to start the Maruthi car project in India. When so many people are starting TV channels, news papers, etc. why TRS was not bothered on them but only Dr. YSR family – who have started projects three decades back on their own, all over India. First, ask TRS Chief to declare his assets before you question others. Now TRS itself is planning to start a TV Channel!!

Even under GO 69 or GO 107, the statistics show that the government used water below the stipulated levels for power production. So, these GOs haven't put a break to use of water below these levels for power production. That means, when power is produced the water automatically goes to downstream of Srisailam dam and not to Rayalaseema!!! When government – involved three CMs – issued GO 111 in 1996 to protect Himayatsagar & Osmansagar reservoirs, which was later upheld by Supreme court in 2000, vested groups started destroying them in violation of GO 111, has any member of TRS raised their voice against these violations – no, because some TRS members are also party to these violations. When environmental groups are fighting against menace of pollution, why TRS leaders are going to the polluting industries and collecting huge sums???

Question 4: Why Pothyreddypadu HR was increased from 11000 cusecs to 55000 cusecs by YSR without proper approvals & stiff resistance from Telangana Cong leaders [late P.Janardhan Reddy & Marri Shashidhar Reddy] & other opposition leaders? .

Answer: PJR & MSR are not the government. It is not 55000 cusecs but it is only 44000 cusecs. Who has to give the approval? PJR or MSR or Karnataka Government or Orissa government or Maharashtra government!! ! You all know the fact, at all party meeting this was agreed to use 44,000 cusecs in 30 flood days — Total water of 120 TMC of which 34 TMC are allocated water and 86 TMC surplus water that includes drinking water and irrigation water. When Hyderbad brothers raised this issue, I myself wrote an article in Martha (a pro-Telangana daily newspaper) on 5-3-2007 after the round table meeting organized by Telangana Engineers forum & others – which I referred earlier also. Has any north Telangana leader opposed the excess use of water? As long as selfish interests are there, we don't expect any thing from such people. PJR wants third phase from Krishna but MSR and his father suggested use of Godavari water for twin cities drinking water needs and use Krishna water to serve the drinking water needs of fluoride effected villagers in Nalgonda district (such villages a plenty in other two regions also but no body suggested providing drinking water to those villages). I myself proposed this through my articles.

Question 5: Why Ponnala - the irrigation minister opened 2 gates of Srisailam just few days before floods & closed them within 2 hours. Which Seema leaders threatened him?

Answer: Government has all powers; no body can stop the government's action –

this I also said during the TV channel live programme on 2nd October —. We must ask ourselves, has the government released water to Rayalaseema after the incident you mentioned? No, on the contrarily Irrigation minister announced that he will release water on 15th October for Rabi irrigation & drinking water to all the regions.

Question 6: Why YSR Govt. gave the escalated costs of EPC contractors in addition to the agreed project costs in many of the irrigation projects?

Answer: This is another cheap statement, which I have seen in media also. If any body got proof, can go to court – we will also support them. All over the world, the project costs escalate to several reasons. Take for example, Narmada Dam. It was escalated by more than 100 times to the original plan with court cases by NBA. I wrote articles against the NBA openly on that issue. If there are wantonly increased to amash wealth, let the engineers give all the details, I will also join the group to expose such illegal actions. Everybody has freedom to express but when it comes with statistics it get weight. Did you at any time asked ——, where he put all that crores of rupees collected through the sale of MLA/MP tickets (10 crores for MP ticket & 5 crores for MLA ticket – media exposed this) and TRS votes to TDP – which may be far more than that invested in Jagan projects by few "legally" – they also invested in several other's projects too.

Question 7: Why power generation was not allowed even at 860' water level at Srisailam thus loosing power as well as water to lakhs of acres of Nagarjunasagar ayacut. This foolish action of YS Govt. was Double loss to the state as the govt buying power from outside at very high price & crop loss of crores of rupees in Telangana & coastal dists.

Answer: I never expected such bad language from D. P. Reddy. This itself shows you are not confident on what you are saying. That is not correct way (to use bad language) when you wanted me to answer your questions. You may not know the fact that last year by mistake the engineers released water from Davaleswaram barrage into the Sea causing big problem for Rabi crop in East & West Godavari districts. With his vision, Dr. YSR got huge bores dug in the Godavari river bed and got bumper production. Last years paddy production was record break in the history of state paddy production. In fact, even Telangana also contributed last year's bumper production of paddy in the state. But unfortunately, with all these, the rice prices have gone up as illegal export was rampant. Reports say Nizambad millers kept in neighbouring states gowdowns for illegal export. If government would have not provided power to agriculture (more than 60% is used in Telangana region – in the state around 20 to 30% paddy area comes under wells/bore wells, lift irrigation only) we would have not achieved such a bumper paddy production. In Telangana region, the power consumption per pump is far higher than that of other two regions as illegal tapings are rampant with high HP, I wrote articles on this. If illegal use of water was not taken place, at the end of the last irrigation-year, Nagarjunasagar reservoir should have been more than 2/3rds capacity that would have helped Kharif

crop in Telangana this drought year. To avoid such misuse & wasting of water, the water is maintained between 880 to 885 ft in Srisailam dam – can you cite any incident without providing water to Nagarjunasagar ayacut government providing water to Rayalaseema ayacut?

Why at 860 ft level power was not produced — it is not a big issue, any sensible engineer will do that because of severe prevailing drought conditions; store what ever little water enters the dam for emergency use – principally for drinking water needs. If any engineer does not understand such basic issue, he is unfit for that post. Drinking water needs get top priority in drought conditions. In fact government declared drought in several mandals.

Question 8: Funniest part of the Govt. policy is that they are taking water from Nagarjunasagar back to Srisailam for power generation using advanced reversible turbines at Srisailam. Is it not a fact?

Answer: Are you worried on this or Are you worried that with this Telangana and other region will not get water as per the tribunal award or Are you worried, in future the excess from the surplus water may not be available for illegal use? No body on the earth can stop water distribution as per the tribunal order to all the regions. The method provides means to produce more power with the same water that will help Telangana lift irrigation projects. Don't you want lift irrigation projects to operate on Godavari River!!! K. P. Reddy himself says Srisailam dam acts as storage tank to facilitate power production.

Question 9: Why CWC recommendations/ warnings were not taken seriously & not followed by Srisailam engineers & the minister etc.? Why water level on flood day was 881' at Srisailam or you wanted all water should enter the sea?

Answer: I answered this point in my letter to PM in detail as well on the TV channels live telecast. During floods it is natural that excess water enters the Sea. From Krishna River on an average 600 TMC enters the Sea while it is around 3000 TMC from Godavari River. After this flood all the three dams were full and around 400 TMC of water entered into the Sea – during full moon the sea tides will be high. We must not forget that government declared drought around 900 mandals just before this flood. No sensible governments take the step to empty Srisailam dam and keep the water in Nagarjunasagar dam for illegal use.

The first issue: In Musi River basin due to terrain, Nawabs developed chained lakes. After filling one, water enters the next. The same is seen on Krishna River. After filling of Almatti dam, surplus water released to Narainpur dam. Narainpur dam also gets water from local catchment area. After filling of Narainpur dam, Jurala dam in Andhra Pradesh gets surplus water along with local catchment water. After filling the Jurala dam the surplus water enters Srisailam dam in addition to the local catchment – in fact Srisailam dam got filled with local catchment area rains

only on two or three occasions in the last year and reached 885 ft – in fact this was not taken into account while calculating distribution of allocated water to three regions —. Kurnool was under floods. In Kurnool, there is no way to stop submergence with heavy rains from the upper catchment areas but only precautionary measures like shifting of people to safer places is the only solution. In this, the Revenue department failed miserably even after warning and even with the last year's experience. That is, Kurnool disaster is due to inaction of revenue officials (which I told from TV channel also) – though they say, there were no raingauges. It is not correct, as every Mandal is supposed to have a raingauge under the supervision of Revenue authorities. Also CWC officials warning & IMD reports clearly indicated the danger to Kurnool town.

The second issue: The flooding of Kurnool and Mantralayam was due to heavy rains in the upstream – K. P. Reddy's statement flooding is due to back water from Srisailam dam is not correct — . It was happened last two years in the case of Kurnool. No body can stop flooding of Kurnool with heavy local upstream rains basically because, houses were constructed in Hundri river bed as well in the big rain water drains – this I made it clear during my TV channel live discussion itself. I also, told that backwater from Srisailam will not enter Kurnool. This has come correct. While back water entering Mahboobnagar & Nandyala zone, the flood water from Kurnool started receding with rains stopping. I also told to evacuate people living along the Krishna River in Mahboobnagar district as back waters effect them. But, no body bothered including TRS and all political parties – TRS never bothered on calamities.

The third issue: The level in Srisailam dam was not 881 ft but it was at 883.4 ft. Unlike Dr. YSR, the present CM was busy on the 1st October meeting and drawing strategies to keep his position in tact with supporters expecting ministerial berths & other benefits; instead monitoring the flood situation with the officials based on CWC warnings, water levels in the dams and weather forecast of IMD. Even on 2nd morning he was busy with attending functions & inaugurations. Only after, TV channels made scathing attacks on CM on his inactiveness on the serious issue, he started briefing the media casually – immediately after this I openly exposed his inactive posture. After everything happened he started monitoring. This he would have done it on the 1st October, which would have saved the disaster in Mahboobnagar district, Nandyala area, and down stream of Srisailam upto the Sea. Everybody including K. P. Reddy agrees on this but they don't want to blame CM, which I did. Because of this, it is a man made disaster!!!

The fourth issue: Evacuation of people after the Srisailam dam. In coastal Andhra there is well trained network to execute the flood disaster management. We told the government to start evacuating all those people living on the river bed as well on the banks, identified low lying areas by "force" and keep a vigil on the property from theft – as people are afraid of leaving their belongings at home. Government delayed this action too. Majority of them are living illegally (even in the

case of Mahboobnagar district, people were paid compensation but they preferred to live there and cultivate the land as usual). With the flooding, people came to know the illegal use of water by putting Holes to Karakattas (protective walls, some were built by Britishers) – pipelines — and pumping water through motors, etc. These created more flood hazard in some zones. The government action was delayed by local people as they refused to leave as well past governments knew the illegal activities and yet no action was taken to protect the flood plains from disaster due to vote bank politics. Same is the case in twin cities, people & realtors though illegally encroached the water bodies, rivers/riverbeds and drains no action was initiated; with this roads are flooding with few drizzles of rain.

Question 10: Why all most all the engineers — A.E to C.E are from Seema area only? Why so many vacant post in senior level?

Answer: If you got statistics of these from the formation of the state, please give it to me then I can give my opinion. As most of the allegations from separatist movement groups are from the air (see my article in Martha, 13th September 2006). Not based on facts but based on fiction like climate change, by using this IPCC, a political body and Al Gore received Noble prize but when British court found fault with his (AlGore) film and asked to answer 9 questions he refused to answer even in public. Now, Irish film makers have made a counter film "Not evil just wrong?", Mr. Prelim McAleer as director, the documentary film is going to be released on 18th October 2009 (spent 1 million dollars and took 3 years to complete).

Question 11: Why Krishna basin water is diverted to Penna basin areas?

Answer: I am not sure on this. Through Polavaram around 80 TMC is expected to be transferred from Godavari basin to Krishna basin. Twin cities are in Krishna basin but water from Godavari basin is used to meet the drinking water needs. The proposed major project Chevella-Pranahita is doing the same. It is a matter of convenient and some times facilitates better utilization of water. If by this way, some body uses in excess over the allotted water then, I will be the first person to fight against such violations – see 17th Sakshi edit page article, where the writer has given details on the surplus water use and the interim order by the tribunal on such projects (they are not illegal projects as stated by ——. This was also mentioned by me in mail sent to PM).

Question 12: Why there are no permissions for most of the Seema projects taking Krishna water?

Answer: This is the case with projects in all the three regions as well other states too. If we wait for the project clearance first, no project would have been completed in this country. You see the major project, Polavaram – day in day out for the last several years vested groups are creating hurdles. CPM is worried about vote bank & illegal funds, NGOs are behind illegitimate illegal ganja & other forest materials smugglers. Some have political interests, they like entering around 3000 TMC on an

average into the Sea and they don't want others using that water in the down ward zone. See for more details Sakshi edit page article of 17th October 2009. Even the MoEF started creating hurdles – new law will not apply to a project approved prior to the new law and yet MoEF delaying approval at the behest of some vested NGO groups. This automatically escalates the costs of projects.

Question 13: Why CE-Hydrology is not coming openly on Floods as he is the authority on Water management? Why other IAS officers & engineers are commenting on the disaster?

Answer: During floods, there is a mechanism to clear the directions to lower officials. In fact this decision is supposed to be taken at "CM level" with the advisory of officials & engineers and State Remote sensing agency that includes advisories from IMD & CWC. In the present case no such advisory meet was held (as I mentioned in my mail to PM). Dr. YSR always followed this. Maintenance of the projects is the responsibility of engineers but most of them are sleeping on this vital aspect. On 2nd we tried to get their opinion through channel reporters but they expressed their ignorance!!! To open one gate took three days.

Question 14: Why Telangana share of waters as per the Bachawat award were not given to Telangana area & govt. diverting Telangana waters to seema area?

Answer: This is false propaganda by separatist groups to serve the point of separating the state. In fact more than the share of water is being used for the last 20 to 25 years – this is in fact clear from the report published by V. Prakash (cited earlier above) – we have even seen how farmers are extracting water illegally by putting holes to karakattas and pumping. Even the power use under agriculture sector, more than 60% is used by Telangana farmers. Is it not a fact – You can see articles by separate Telangana tink-tank in vaartha and my summation of those articles appeared in vaartha, 13th September 2006. These clearly suggest for the last 20 to 25 years, the water meant for Rayalaseema was illegally used by others. Now, through Pothireddypadu they want use their right.

——— In fact even before that I wrote several articles demanding on free power. Dr. YSR, after becoming CM, the first file he signed was on "Free Power" to agriculture.

All India Election watch group took me as a member of that group. In the three state elections, the group collected information on the candidates' assets. It is quite amazing, majority of them are crorepathis. The MLAs seeking re-election, the assets growth was amazing. Every body enters into political arena to amash wealth; no body is interested in poor citizens in India or elsewhere in the world including leaders fighting for separate countries or states.

Because of my straightforwardness in my attitude majority media likes me.

Though I am the top scientist in the world in my field (lot of Western scientists during their visits to India expressed the same to their counterparts and suggested to them to take my assistance forgetting that Indians are more interested for funds and foreign trips than on science), the scientific community is afraid of my frankness, with this I got more enemies than friends. This is normal. You scratch my back and I scratch your back type science, you get more friends and more Ph.D.s.

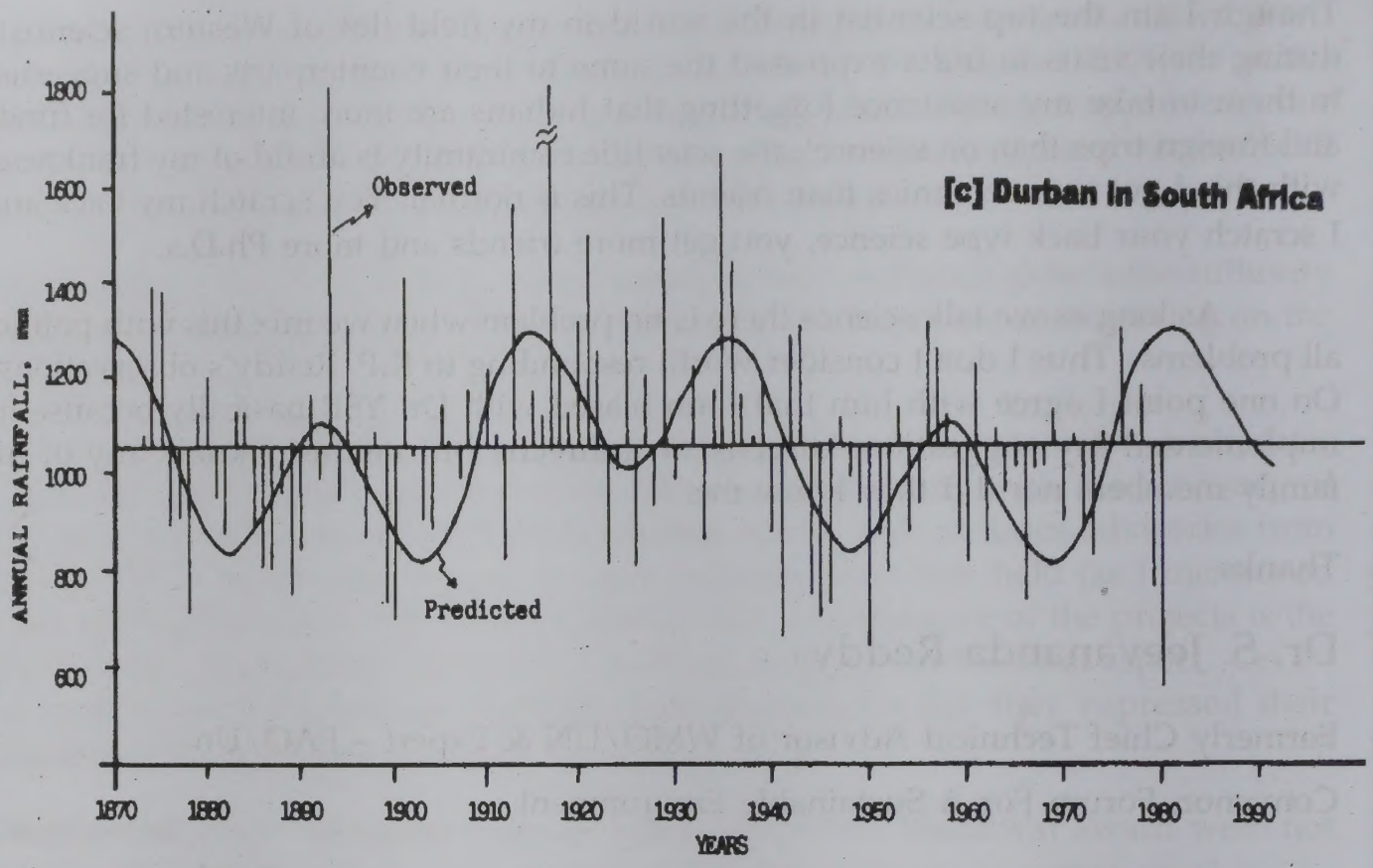
As long as we talk science there is no problem when we mix this with politics all problems. Thus I don't consider worth responding to K.P. Reddy's observations. On one point I agree with him that I am biased with Dr. YSR basically because he implemented my suggestions directly or indirectly but neither I knew any of his family members nor did they know me.

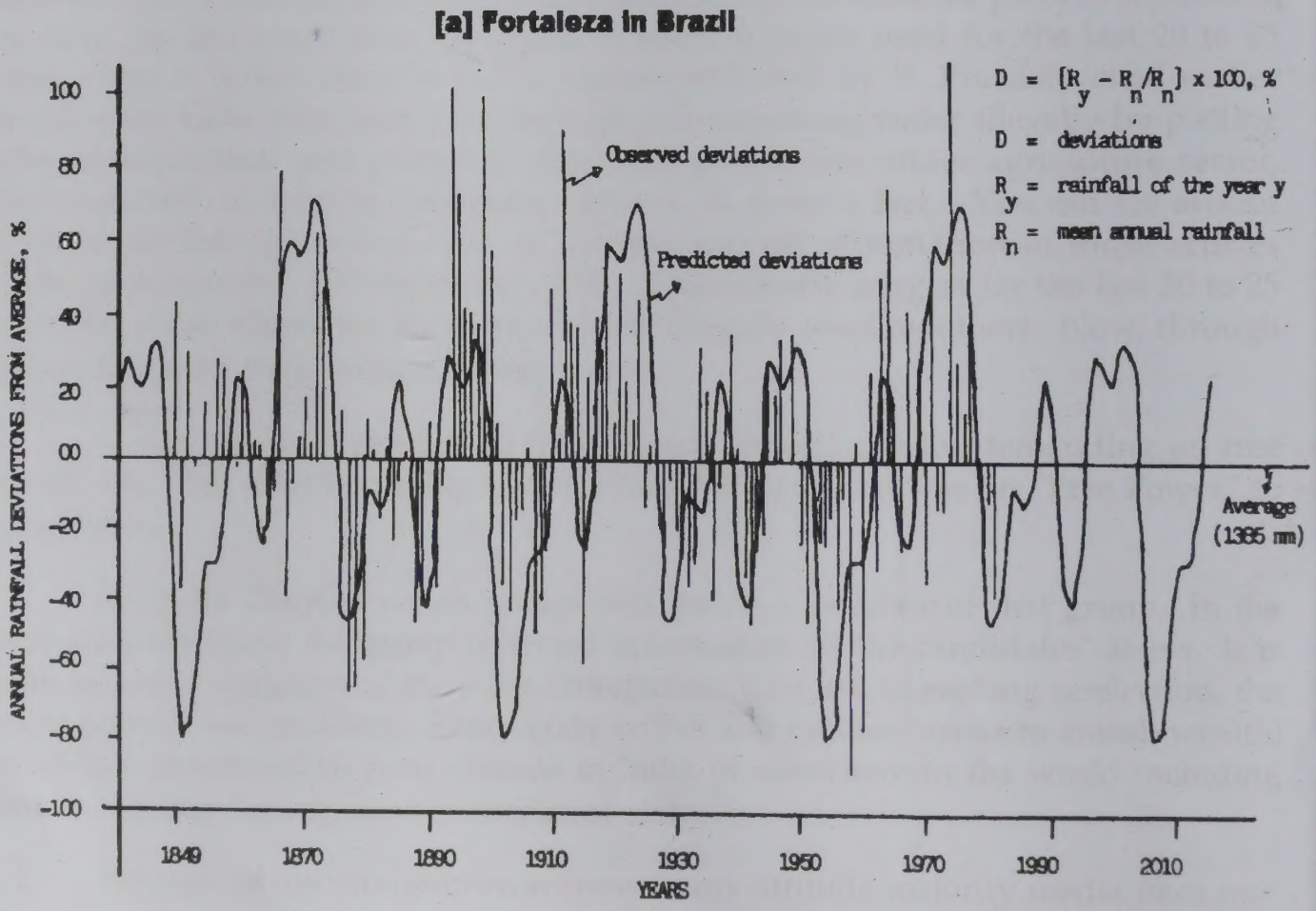
Thanks

Dr. S. Jeevananda Reddy

Formerly Chief Technical Advisor of WMO/UN & Expert – FAO/Un

Convenor, Forum For A Sustainable Environment


[c] Durban in South Africa
Observed
Predicted
ANNUAL RAINFALL, mm
1800
1600
1400
1200
1000
800
600
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
YEARS


[a] Fortaleza in Brazil
D = [R y − R n /R n] x 100, %
D = deviations
R y = rainfall of the year y
R n = mean annual rainfall
Observed deviations
Predicted deviations
Average (1385 mm)
ANNUAL RAINFALL DEVIATIONS FROM AVERAGE, %
100
80
60
40
20
00
-20
-40
-60
-80
-100
1849
1870
1890
1910
1930
1950
1970
1990
2010
YEARS

తెలంగాణ రాష్ట్రోద్యమ పీఠిక: విశ్లేషణ

డా॥ సజ్జల జీవానందరెడ్డి

వార్త 2-1-2010

వార్తలో (డిసెంబర్ 30,2009) ప్రచురితమైన "నాయకత్వం విస్మరించరాని విషయాలు: తెలంగాణ రాష్ట్రోద్యమ పీఠిక (ప్రియాంబుల్)" అనే వ్యాసం ద్వారా కల్పన కన్నాభిరాన్ (+సాగర్ రాందాస్, ఎస్.మధుసూదన్) ఏమి చెప్పాలనుకున్నారో వారికే తెలియాలి. కొత్త రాష్ట్ర ఫలితాలను తాము కూడా అనుభవించాలనే ఆకాంక్ష కొట్టవచ్చినట్లు కనిపిస్తున్నదేగాని ఏ విషయంలోనూ "క్లారిటీ" లేదు. ప్రతి ఒక్కరు గాలికబుర్లతో వ్యాసాలు రాస్తున్నారేగాని వాదిని ఖచ్చితమైన గణాంకాల ద్వారాగాని, అలాంటి పరిస్థితులు మిగతా ప్రాంతాలలో రాష్ట్రాలలో లేదా అనే దానిని పరిగణలోకి తీసుకున్న దాఖలాలు కనిపించవు. ఇలాంటి గాలికబుర్ల ద్వారా విద్యార్థులను రెచ్చగొట్టి ప్రజా సంఘాలు, ప్రజా నాయకులు వారి పబ్బంమాత్రం గడుపుకుంటున్నారే తప్ప ప్రజల బాగోగులు గాని, విద్యార్థుల బాగోగులు గాని వారు ఆలోచించడం లేదు. ఇలాంటివి సరియైన ఉద్యమాలేనా! ఇలాంటివి కొన్ని విషయాలు చూద్దాం.

రచయిత్రి తన వ్యాసాన్ని ఆర్థిక, రాజకీయ, సాంస్కృతిక పీడనా చరిత్ర నుంచి విముక్తి అని మొదలు పెట్టడం జరిగింది. దీనిలో కోదండరామ్, రత్నమాలల నిజాయితీపై మాట్లాడటం జరిగింది. కోదండరామ్ టీఆర్ఎస్ కార్యకర్త అనేది 2009 జరిగిన ఎన్నికలలో ప్రముఖపాత్ర పోషించడం జరిగింది. ఇప్పుడు కోదండరామ్ జెఏసి కన్వీనరు. కానీ అందరి తరపున అయన మాట్లాడేదిపోయి, ప్రతి రాజకీయ పార్టీ నాయకులు వారి ఇష్టానుసారం మీడియాతో మాట్లాడటం మనం చూస్తూనే ఉన్నాం. ఒకాయనను చేతులతో చెప్పులతో కొట్టి కాళ్ళతో తన్నడం అయింది. అయనే ఇప్పుడు ఆపార్టీ తరపున జెఏసిలో మెంబర్. అలాగే ఇదికాక పార్టీ వారికి ఆధిపత్యం తగ్గుతుందనే భయం పట్టుకుంది. అంటే ఇందులో కోదండరామ్ ఏమిటి? అనేది ప్రశ్నార్థకం. దీనిలో ప్రజానాయకుల రాజ్యకాంక్షకు అనుగుణంగా రంగులు మార్చుకుంటూ పోతున్నారే తప్ప వీరికి ప్రజలు, వారి ఆకాంక్షలు పట్టలేదు. ఇది న్యాయమేనా!

వనరులను కొల్లగొడుతున్నారని నిందలు పెట్టడం ద్వారా రచయిత్రి వివిధ ప్రాంతాల, రాష్ట్రాల పాత్ర, తెలంగాణా పాత్ర ఎంత అనేది కూడా చెప్పలేదు. గణాంకాలతో వివిధ రంగాలలో ఎవరెంత దోచుకున్నది చెప్పినప్పుడేదానికి "క్రెడిబిలిటీ" వస్తుంది. మన రాష్ట్ర మూడు ప్రాంతాల నుంచి అమెరికాలో, వివిధ రాష్ట్రాలలో, దేశాలలో ఉంటున్నారు. వీరంతా వారిని దోచుకుంటున్నారా! అది ఎంత? మనమూడు ప్రాంతాలవారు, దోచుకున్నది పక్కరాష్ట్రాలలో,దేశాలలో 'ఇన్వెస్ట్' చేస్తున్నదెంత?

వనరుల విషయానికివస్తే ముఖ్యమైనవి నీరు, విద్యుత్, సబ్సిడీ ఎరువులు, బుణాలు వగైరాలు. కృష్ణానది నీటి విషయానికి వస్తే ట్రిబ్యునల్‌లో మన రాష్ట్రానికి మన రాష్ట్రంలోని మూడు ప్రాంతాలకు నికర జలాలు కేటాయించడం జరిగింది. ఇది మూడుప్రాంతాలు వాడుకోవటం జరుగుతున్నది. ట్రిబ్యునల్ అంతేకాకుండా వరద జలాలను మన రాష్ట్రానికి వాడుకునే హక్కుఇవ్వడమేగాక, దీనిని డ్రై ప్రాంతాలకు రాయలసీమ, దక్షిణ తెలంగాణ, దక్షిణ కోస్తా ఆంధ్ర వాడుకునే హక్కు కల్పించారు. గత 20-25 సంవత్సరాల గణాంకాల ప్రకారం ఈ వరదనీటి 800 టిఎంసిదాకా ఉంది. దీనిలో నగం వాడుకోవచ్చు. 1980 నుంచి 2004 మధ్య కాలంలో ఈ నీటిని వాడుకునే దిశలో ఈ మూడు ప్రాంతాలలో శిలాఫలకాలు నాటడం జరిగిందేకాని, విధివిధానాలతో ప్రాజెక్టులో ముందుకు పోలేదు. గత 20-25 సంవత్సరాలుగా ఈ ప్రాజెక్టులకు మొత్తంలేక వరద జలాలలో 200టిఎంసి దాకా నికర జలాలతో కలిసి వాడుకోవడం జరుగుతున్నది. ఈ ప్రాజెక్టులు పూర్తి అవుతే ఈ 200 టిఎంసి నీరు వాడకం ఆగిపోయి, ఎవరు వాడుకోవాలో వారే వాడుకోవటం జరుగుతుంది. అందువల్లే ఈ ప్రాజెక్టులకు అనుమతులు లేవనే వాదన లేవదీసి, మా నీరు దోచుకుపోతున్నారనే వాదన తీసుకు రావడం జరిగింది. నికరజలాల వాడకానికి ప్రాజెక్టు అనుమతులు ఉంటాయి కానీ వరద జలాలకు ఇలాంటి అనుమతులుండవు. ఎందుకంటే వరద జలాలు ఉన్నప్పుడే వాడుకోవాలి కాబట్టి. ఈ వరద జలాలు వాడుకోకపోతే పై రాష్ట్రాలు వాడుకుంటాయి, దీనికి ఉదాహరణ అలమట్టి ఎత్తు పెంచటమే నిదర్శనం. ఇది న్యాయమైన వాదనా! ఇది ఉన్నవాడు లేని వాడిని దోచుకోవడం కాదా!.

గత సంవత్సరం వరదనీటి ఉపయోగం ఎక్కువగా ఉండటం మూలంగా ఇల్లీగల్‌గా వాడుకునేవారు. 400 టిఎంసి వాడుకోవడం ద్వారా 2008-09 బంపర్ ప్రొడక్షన్ రావడం జరిగింది. దీనినిబట్టే మనకు అర్థమవుతున్నది, తెలంగాణాను ఎవరు మోసం చేయలేదని. కానీ వారే ఇతరులనే మోసం చేసే దిశలో నీటిని వాడుకోవడం ద్వారా 2009లో నాగార్జున సాగర్‌లో నీరు లేక 2009లో ఖరీఫ్ పంటకు నీరులేదు. మనం ప్రాజెక్టులద్వారా నీటి విషయానికి వస్తే భూగర్భ జలాలు పెరగడం వాటి వాడకం కూడా ఈ నీటి వనరుల వాడకం కిందకే వస్తుంది. ఈ నీటిని విద్యుత్ వాడకం ద్వారా వ్యవసాయానికి ఉపయోగించు కోవడం జరుగుతున్నది. ఈ విద్యుత్ వాడకం 60శాతంకు పైన తెలంగాణాలో వాడుకోవటం జరుగుతున్నది. లెఫ్ట్‌ఆరిగేషన్ ప్రాజెక్ట్స్ పూర్తయితే 95 శాతం విద్యుత్ వ్యవసాయరంగంలో తెలంగాణ వాడుకోవటం జరుగుతుంది. అంటే తెలంగాణే ప్రత్యేక రాష్ట్రం ఏర్పడితే ఉత్తర తెలంగాణాకు ఇప్పటివరకు వాడుకుంటున్న నీరు తగ్గుతుంది, విద్యుత్ భాగం 95 శాతం నుండి 40 శాతానికి తగ్గుతుంది. ఇప్పటివరకు ఫ్రీపవర్ పైసా భారం లేకుండా ఇవ్వడం జరుగుతున్నది ప్రత్యేకరాష్ట్రం ఏర్పడ్డాక ధర్మల్‌పవర్ (ఒక యూనిట్ రూ.3.00) ఏ ప్రభుత్వమైనా ఇవ్వగలదా! అందువల్లే దేశంలో ఎన్నో రాష్ట్రాలు ఇందువల్లే ఫ్రీపవర్‌ను అమలుపరచడంలేదు. చెరువుల కింద పొర్లుదం 50శాతంకు పైన తగ్గిపోయింది. ఎరువులకిచ్చే సబ్సిడీ భాగం తగ్గుతుంది. ప్రభుత్వం రైతులకే సబ్సిడీ ఇస్తానని చెప్పారు.

దక్షిణ తెలంగాణా కోస్తా ఆంధ్రప్రాజెక్టులకు వరదనీటిలో భాగంగా 81 టిఎంసి గోదావరి నీటిని కృష్ణానదికి పోలవరం ద్వారా మళ్ళించడం జరుగుతుంది. దీనికి అనుమతి లభించింది. అంటే ఇక్కడ వరద జలాలను నికర జలాలుగా మార్చుకోవడం జరిగింది. గోదావరి నీటి విషయానికి వస్తే ఇప్పటివరకు మనకు ట్రిబ్యునల్ ఇచ్చిన నీటిలో 50 శాతం కూడా వాడుకోవటం జరుగలేదు. మన దేశానికి తెలంగాణా బిడ్డ పివి నరసింహారావు అయినప్పటికి దీనిలో ఎలాంటి చలనం జరగలేదు. 2004 తరువాత పోలవరం, చేవెళ్ళ ప్రాణహిత ద్వారా మిగతా 50శాతం నీటిని వాడుకునేందుకు ప్రపోజల్స్ పెట్టడం జరిగింది. ఇంకా 1500 టిఎంసిల వరద నీటిని వాడుకోడానికి ప్రాజెక్టులు లేవు!

ఈ వ్యాసరచయిత్రి పౌరహక్కులకు, మానవహక్కులకు కట్టుబడిన వ్యక్తులు ఉద్యమ నాయకులలో ఉండటం తెలంగాణ ఉద్యమ ప్రత్యేకత అంటారు. విశాఖపట్నంలో కమ్యూనిస్టుల భూపోరాటం మొదలుపెట్టిన మొదటిరోజు. మావోలను ఉపయోగించుకోవడం జరిగింది. పోలీసులకు మహిళా కార్యకర్తలకు మధ్యన జరిగిన ఘర్షణలో మన సినిమాలలో చూపించే దృశ్యాలకంటే దురదృష్టకర దృశ్యాలు టివిలలో చూడాల్సి వచ్చింది. అది చూడలేక, లేట్ బాలగోపాల్‌గారికి ఫోనుచేసి, ఈ విషయంపై మీరు కమ్యూనిస్టులతో ఎందుకు మాట్లాడకూడదు అంటే, అయనగారు ఫోను టపామనిపెట్టడం జరిగింది. ఆదివాసీలు ఒక తెలంగాణా ప్రాంతంలోనే ఉన్నారా! మిగతా రెండు ప్రాంతాలలో నివసించే ఆదివాసీలు, పౌర సంఘాల దృష్టిలో వారు ఆదివాసులు గాదా! భూస్వామ్య పీడనకు గురైన వారికి తెలంగాణా రాష్ట్రంలోని ముక్తికలిగిస్తుందా! తెలంగాణా పోరాటంలో ముందున్న వారంతా భూస్వాములు కాదా!. కోదాను కోట్లు ఆస్తులు కూడబెట్టుకున్న వారు కాదా!. ఈ భూస్వామ్య వ్యవస్థ మిగతా రెండు ప్రాంతాలలో లేదా! సాయుధ పోరాటంలో రజాకారుల కాలంలో మిగతా ప్రాంతాల పాత్రలేదా! వారి అండదండలు లేకుండానే సాగిందా! తరువాత హైదరాబాద్ రాష్ట్రం మూడుముక్కలయింది. ఒకటి మహా రాష్ట్రలోకలిస్తే, రెండవది కర్నాటకలో మూడవది ఆంధ్ర రాష్ట్రంలో హైదరాబాద్ కేపిటలసిటీగా ఆవిర్భవించింది. ఇప్పుడు 2004 నుంచి ఇప్పటివరకు ప్రజలుతీర్పు రాష్ట్ర వాదాల వల్ల ప్రజలకు ఎలాంటి మేలు జరుగదని గ్రహించారు. అందుకే హింస ద్వారా ఉద్యమాన్ని నడుపుతున్నారు.

స్త్రీలహక్కుల విషయానికివస్తే, ఇది ఒక ప్రాంతానికి, రాష్ట్రానికి సంబంధించినదిగాదా. అలాగే అంతర్జాతీయ పెట్టుబడిదారి విధానం కూడా ఒక ప్రాంతానికి, రాష్ట్రానికి సంబంధించినది గాదు. ఇవి దేశానికి సంబంధించినవి. ప్రత్యేక రాష్ట్ర సాధనలో భాగం అంతకన్నాకాదు. అలాంటి పరిస్థితులలో ఈ విధానం ఒక తెలంగాణా ప్రాంతాన్ని మాత్రమే 'ఆర్థికవ్యవస్థలను, జీవితాలను ధ్వంసం చేస్తుందనేది' హాస్యాస్పదం. కొత్త రాష్ట్రం ఏర్పాటు కొరకు వెనుకగల ప్రధానమైన ఆలోచన ఆర్థిక అసమానతల పట్ల, ఆధిపత్య ధోరణుల పట్ల వ్యతిరేకత అయినందున అంటారు రచయిత. ఇలాంటివి మిగతా రాష్ట్రాలలో, మిగతా ప్రాంతాలలో, జిల్లాలలో, మండలాలలో లేవా! ఉత్తర తెలంగాణాకు దక్షిణ తెలంగాణాకు లేవా! ప్రత్యేక రాష్ట్రం ఏర్పడితే ఇది సమసిపోతుందా!

హైదరాబాద్ దానిచుట్టు వక్కల 15 లక్షలకుపైన చుట్టు వక్కల ప్రజలు రాభం పొందారు. అంతేకాదు, విద్యా ఆరోగ్యం వగైరాల వల్ల రాభం పొంది, వారిపిల్లలను బయటిదేశాలకు పంపించుకున్నారు. రియల్‌ఎస్టేట్‌వ్యాపారం మూడు ప్రాంతాల వారేగాక, ఇతరరాష్ట్రాల వారు కూడా ఉన్నారు. రాష్ట్ర అవతరణకు ముందు ఎంత వెనుకబడిన తెలంగాణా ఇప్పుడు వారి అభివృద్ధి అన్ని రంగాలలో మిగతా రెండు ప్రాంతాల కంటే గణనీయంగా పెరిగింది. రాష్ట్ర రాజధాని కాబట్టి ఎందరో ఇక్కడ ఉద్యోగరీత్యా, బ్యాంకులు, పరిశ్రమల వల్ల ఎందరో ఇక్కడ స్థిరపడ్డారు. వారిని కడుపు పట్టుకొని వచ్చారని అనడం దురదృష్టకరం. తెలంగాణా జిల్లాల నుంచి కూడా వచ్చారు గదా, వారు కూడా కడుపు పట్టుకొని వచ్చారా!.❑

About the Author

The author, Dr. Sazzala Jeevananda Reddy, is one of the few scientists who started his carrier in the science of climate change as back as early 1970s. One of Dr. Reddy'ss work was identified in 1976 as one of the fifteen papers of unusual interest (most of them related to the subject of climate change) by SCOSTEP (Scientific Committee on Solar Terrestrial Physics) of American Academy of Sciences from among the entire literature published in national and international journals in Solar Terrestrial Physics up to that time. Dr. Reddy carried out analysis using observed meteorological data series over different parts of the globe. Using findings from such studies, Dr. Reddy presented a concept of adopting agriculture in long-term agriculture planning in the semi-arid tropics. In this direction Dr. Reddy brought out several books to educate world community; and published articles in national and international journals and as well presented at several national and international conferences. The review of one such book published in 1993 was presented by Vice-President and in-charge of agricultural meteorology group in World Meteorological Organization of United Nations (WMO/UN), which appeared in an international journal "Agriculture & Forest Meteorology" in 1994. The present book is a part of annexure to a book of the author "Climate Change: Myths & Realities" [www.scribd.com] brought out in 2009. The book is a result of the trend in and around India with reference to droughts & floods vs global warming.

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